THE GAS JOURNAL

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A Glance at the Contents

B.C.G.A.

The question of gas charges was discussed at the annual meeting of members of the Association in Scotland. [p. 256.]

Gas in a Sports Pavilion.

An illustrated description is given of a gas-heated hot water plant specially designed for a new sports pavilion at Stanmore, Middlesex. [p. 254.]

South Metropolitan Gas Company.

As will be seen from the report of the Directors, the Company's sales of gas in 1931 increased by more than ¾ p.ct. [p. 248.]

New Wet Meter.

A description, illustrated diagrammatically, is given of a new high-capacity wet meter in which an oil film is employed to prevent evaporation of the water. [p. 259.]

Secretary Required.

Applications are invited for the position of Secretary to the South Suburban Gas Company. The commencing salary will be £800 per annum. [p. 267.]

Naphthalene Washing.

We publish a report of the discussion on Mr. B. Thorpe's paper on this subject before the Yorkshire Junior Gas Association. [p. 262.]

General Manager and Secretary Required.

It will be seen from our advertisement columns that the Swindon United Gas Company are inviting applications for the post of General Manager and Secretary. The salary offered is £650 per annum. [p. 267.]

Australian Gas Institute.

An extract is published of the Presidential Address of Mr. A. E. Bradshaw to the Australian Gas Institute. Among other matters, he deals with costing, and gas legislation in Australia. [p. 257.]

Dry Coke for Water Gas Manufacture.

Tests carried out by the Rochester Gas and Electric Company over a ten-day period showed a 6 p.ct. saving in fuel by using dry quenched coke for water gas manufacture. [p. 252.]

Forthcoming Engagements

Feb. 5.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Annual Dinner.

Feb. 5.—SCOTTISH JUNIOR GAS ASSOCIATION (EASTERN DISTRICT).—Visit to Messrs. Alder & MacKay, Ltd., Edinburgh.

Feb. 6.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Visit to new works at Lostock Road, Preston. Paper on "Industrial Gas Furnaces" by Mr. G. H. Windiate, of Stretford.

Feb. 6.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Paper by Mr. J. Leckie.

Feb. 8.—INSTITUTION OF GAS ENGINEERS.—Finance Sub-Committee, 2 p.m.; Finance Committee, 2.30 p.m.; Executive Committee, 3 p.m.; 28, Grosvenor Gardens, S.W. 1

Feb. 8.—MIDLAND ASSOCIATION.—Annual Dinner and Dance, Grand Hotel, Birmingham, 6.30.

Feb. 9.—INSTITUTION OF GAS ENGINEERS.—Council, 10 a.m.; Education Executive Committee, 4 p.m.; 28, Grosvenor Gardens, S.W. 1.

Feb. 10.—INSTITUTION OF GAS ENGINEERS.—Joint Lighting Committee, 10.30 a.m.; 28, Grosvenor Gardens, S.W. 1.

Feb. 13.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to the Frankley Works and Reservoir of the Birmingham Water Department.

Feb. 18.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council Meeting in the afternoon.

Feb. 19.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Meeting in London. Paper by Mr. J. H. Escreet.

Feb. 19.—INSTITUTION OF CHEMICAL ENGINEERS.—Annual meeting in London.

Feb. 20.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Visit to Bingley. Paper by Mr. G. A. Winfield.

Feb. 25.—JOINT JUNIOR GAS ASSOCIATIONS.—Visit to British Industries Fair, Birmingham.

Feb. 26.—JOINT GAS SALESMEN'S CIRCLES.—Visit to British Industries Fair, Birmingham.

March 1-3.—Joint Conference of the Society of British Gas Industries, British Commercial Gas Association, Institution of Gas Engineers, and National Gas Council, British Industries Fair, Birmingham.

May 26.—SOCIETY OF BRITISH GAS INDUSTRIES.—General Meeting in London.

June 7-9.—INSTITUTION OF GAS ENGINEERS.—General Meeting in London.

1932 "JOURNAL" Directory.

Page 32, HIGHBRIDGE. Amalgamation with Weston-super-Mare is in abeyance. See last year's Directory for particulars.

Page 32, HINCKLEY. F. Lee, deceased.

Page 78, ARBROATH. A. C. Young, deceased.

Page 102, MELBOURNE. Metropolitan Gas Company. R. C. Evans appointed Secretary *vice* A. E. Bradshaw, retired.

EDITORIAL NOTES

Gas in Australia

As far as we are aware there are no complete details of the progress of gas in Australia during this century, but, thanks to the work of the Research and Investigation Department of the Australian Gas Light Company, valuable statistics have already been rendered available, and it is anticipated that before long the figures relating to all undertakings will be collated. A good idea of what has taken place since 1921—that is, during 1921-30—however, can be gained from the fact that in that period the quantity of gas manufactured by fifty of the leading concerns in the Commonwealth has increased by 30 p.ct. (from 14,644 million c.ft. to 19,080 millions). This includes a decrease for the year 1930, which, considering the state of affairs in commerce and industry, is not surprising. Throughout this time competition has become more and more powerful, and this competition applies to both gas and coke. The latter has to face low-priced brown coal briquettes, and the prices of local coals have been greatly reduced; also, fuel oil is a formidable competitor.

This information is from the Presidential Address of Mr. A. E. Bradshaw, Secretary of the Metropolitan Gas Company of Melbourne, to the Australian Gas Institute; and what he has to say about the progress of gas in Australia, and the steps which should be taken to ensure the future prosperity of the Industry, is based on a wide, lengthy, and intimate knowledge. Mr. Bradshaw, who has had fifty-five years' active service with the Company, retired on Dec. 31 last; and his observations, therefore, constitute a valedictory expression of advice which is well worth following. The address gives a clear picture of gas affairs in Australia. In regard to coke, water gas plant has been installed by the Metropolitan Company, to effect some control on market prices, but Mr. Bradshaw looks upon this only as an ameliorating measure—not a solution to the problem. Competition cannot be met unless gas coke is properly prepared for the market, and sold in a modern way as an efficient commodity. Correct grading and uniformity of quality in the various grades are necessary to success. Even in the production of water gas, it is evident that quality of the coke employed has a far more important bearing than is generally realized. In this connection we draw attention to the findings of Mr. A. B. Wolle, who, at the works of the Rochester Gas and Electric Company, has carried out a long-period test on the use of dry quenched coke for water gas manufacture. The major conclusion is that dry coke means a saving of 6 p.ct. in fuel, but there are other important advantages. As dry coke has little or no surface moisture, it carries practically no dust—which, of course, means smoother working of the plant in more than one direction. A further significant feature determined by the tests is that, with a moisture-free coke, the average size of the fuel can be reduced. A summary of the conclusions arrived at by Mr. Wolle is published in to-day's "JOURNAL."

To return to Mr. Bradshaw's address, the influence of the yield from "residual" products may be gauged from the following: In 1920, the return from the sale of residuals in Melbourne was equivalent to 53 p.ct. of the cost of coal and oil; in 1930, the corresponding figure was 33 p.ct. In other words, in ten years the relief towards the price of gas has been reduced by about one-third. It is to coke and tar that faith can be pinned justifiably, always with the proviso that adequate care is taken to enhance the appeal of these products to the consuming public. On the other hand, ammonia—well, the outlook is far from bright. This applies to Australia as it does to Great Britain. The annual report of the British Sulphate of Ammonia Federation makes gloomy—though not unexpected—reading. The world demand for bye-product and synthetic nitrogen has fallen more than 13 p.ct. during the past year. In the free markets a fall in price of the order of 50 p.ct. has taken place; and though in normal circumstances such a fall would have greatly stimulated sales, in the present world-wide depression no marked effect can be hoped for. In regard to the consumption of sulphate of ammonia in Great Britain and Ireland, there was a decline of practically 12 p.ct., and exports showed a decrease of 28 p.ct. on the figures for 1929-30. And, as Mr. Bradshaw remarks, "the London f.o.b. prices to-day are lower than they have ever been, and when the exchange position becomes easier a stage will be reached when it will be unprofitable for gas undertakings to operate sulphate of ammonia plants."

Hampering Legislation

IN spite of due regard to the cumulative effect of these adverse factors, however, Mr. Bradshaw is quite rightly thoroughly optimistic concerning the future of the Gas Industry in Australia, if that future is not left to look after itself, and if the Industry *is* left to look after itself. On the latter count, the author is greatly disturbed about the amending gas legislation it is proposed to introduce in both Victoria and New South Wales. The Victorian "Gas Regulation Bill," if it becomes law, will hand over the control of the Industry to one man—a "Gas Referee," who is to be a "competent and impartial person." The gas dictator would determine the calorific value, fix the standard of purity, and decide the minimum pressure, as well as exercise all kinds of control over the manufacturing operations of an undertaking; and he would be able to fix the price of gas and determine the rate of dividend which could be paid. Mr. Bradshaw, it is apparent, regards the whole position as intolerable, and the outcome of party politics. The crux of the matter—that gas is in competition with other fuels—is being forgotten in Australia, just as it is neglected in Great Britain.

Considering the consolidation and development of the gas business, Mr. Bradshaw confines his remarks to three aspects of the problem—gas lighting, salesmanship, and costing. In regard to the first his attitude is the only one the Industry should take—that gas lighting is good lighting, well able to withstand competition on its merits. Where there has been a decline in the popularity of gas the reason is not usually far to seek—either apathy of the gas suppliers or unfair treatment by local authorities. In England gas lighting is on the up grade because gas undertakings are realizing their past foolishness in neglecting a valuable load—the front line of gas sales. As to salesmanship, Mr. Bradshaw, it is good to note, is all for the technical salesman—a man conversant with the capabilities and operation of all appliances on the market—is a strong believer in "home service departments" and public demonstrations, and is emphatic that every member of a gas undertaking's staff is a potential salesman. This last point is not new, but it is too often allowed to remain in the realm of theory. There is too much talk and too little action, and we were therefore glad to publish in our columns last month an account of the success of a gas company's scheme for rewarding those who assist in the satisfactory sale of gas apparatus. This scheme has engendered great enthusiasm. Finally, there is the question of costing, on which subject we had an extraordinarily interesting account from Major R. N. Barnett last week. If waste is to be avoided, costing data and statistical information should be presented to

the management as frequently as possible, and the figures should bear a definite relationship to the final accounts of the undertaking. There appears to be need for greater standardization in the methods of costing adopted by different gas undertakings. This, we suggest—particularly in view of the inevitable tendency towards amalgamation—would afford a fruitful subject for discussion.

New Wet Meter

It is evident from a paper contributed at the annual meeting of the Australian Gas Institute that the author—Mr. S. R. Preston, of Adelaide—does not like the dry gas meter. He accuses it of sins of omission and commission. It does not appeal to him from the point of view of engineering construction; he has no faith in its diaphragm; and he thinks there is little justification for classifying it as a precision instrument in the ordinarily accepted sense of the word. An abstract of Mr. Preston's paper is published in this "Journal;" and readers will, we think, find it of more than ordinary interest, though they may not approve of the author's wholesale condemnation of an instrument which has stood the British Gas Industry in such good stead, and which remains practically the sole means of measuring gas in consumers' premises. Maybe conditions in Australia affect the problem. At any rate, after an investigation occupying three years, Mr. Preston has arrived at the conclusion that works tests give no indication of the efficiency of a dry meter when operating on the district, and, similarly, that any test of a meter after it has been disconnected from the district is to all intents and purposes of little practical value.

Hence the author turned his attention to the wet meter, and, realizing that a measuring device of high capacity was essential, concentrated on the duplex type. Alterations were made in the design of the duplex meter, as a result of which the effective range of accurate registration was increased. The improvements have been embodied in "a meter of entirely novel design," which is fully described, and diagrammatically illustrated, in our columns to-day. A film of oil is used on the top of the water, by means of which, it is confidently anticipated, the meter will require additional water only every two or three years. The space required for the meter—which has a capacity of 120 c.ft. per hour, and an effective margin in accurate registration of 50 p.ct. above the maximum load—is only 122·6 sq. in.; and the pressure absorption at 120 c.ft. per hour is given as 5 tenths only. In other words, the space occupied is 15 p.ct. less than that needed for an ordinary wet meter with a rated capacity of 30 c.ft. per hour. We shall be glad to have the views of our readers on this new meter.

Well-Merited Recognition

It is with pleasure we announce in our "Personal" column to-day that a complimentary dinner and presentation are contemplated in honour of Mr. John Wilkinson, who, as readers may be once more reminded, for many years rendered valuable service to the Nottingham Corporation Gas Department, of which he was Engineer and General Manager. This work will be long remembered, and has been already marked by a presentation on behalf of all sections of workers in the Engineer's Department at Nottingham. On that occasion the gifts were handed to Mr. Wilkinson by Alderman Sir Albert Ball (the Chairman of the Gas Committee), who referred to the high professional qualifications of the recipient and the esteem in which he is held by all who are connected with the gas engineering profession. Far beyond Nottingham Mr. Wilkinson's influence made itself felt. A few years ago he was President of the Institution of Gas Engineers, and that is only one example of his public-spiritedness on behalf of "the cause." It is this wider aspect of Mr. Wilkinson's work for a great Industry which will be marked by the forthcoming dinner and presentation. It provides an opportunity of which full advantage will doubtless be taken, and thanks are due to those to whose friendly feeling the proposal owes its inception.

Transport Charges

The Gas Industry is so largely interested in the transport of heavy merchandise that no suggestion of an increase in charges can be lightly regarded; and such suggestions are now being voiced. The General Managers of the four big Railways have had an interview with the Minister of Transport, for the purpose of expressing their views on the final report of the Royal Commission on Transport; and naturally the effects of the severe road competition to which the railways are now subjected received consideration. Basing their calculations upon a comparison of the year 1930 with 1923, the Railway Companies estimate that, owing to road competition, they have lost net revenue at the rate of £16,000,000 per annum. Of this total, £10,000,000 is attributable to passenger traffic, and £6,000,000 to goods traffic. This is admittedly a serious condition of affairs, and presuming the continuance of this keen competition the Railway Companies are faced with the problems of how to secure an adequate return on their existing capital and how to offer inducement for the provision of fresh capital for necessary works of development.

As is the case with other industries, railway transport must justify itself on a business basis, but that does not imply that it should tamely submit to unfair competition. The Gas Industry can speak feelingly on this point. Now, the railways regard the conditions of the road competition to which they are at present subjected as being distinctly unfair. The Railway Companies have, at their own cost, to build their permanent way, to maintain it, to police it, and to signal it; while the road industry has no corresponding obligation. The railways are, moreover, bound by a complex system of legal regulation, while the road haulage industry is entirely unfettered in this respect. The General Managers submitted that the whole cost of maintaining, policing, and signalling the roads, and the whole capital expenditure incurred in building or improving roads to meet the requirements of motor traffic, should fall upon the users of the roads in proportion to their use. To this extent, what the railways are hinting at is a "levelling-up" process, which would doubtless divert some of the business from road to rail, but which would have as another result a tendency to restrict, rather than to increase, the amount of transport spread over the rival methods.

Another suggestion ventilated which should not have this restricting influence on transport, and which is likely to be hailed with satisfaction by both motorist and pedestrian, was that all vehicles intended for the carriage of freight traffic by road should be licensed, and that licences should only be granted subject to certain conditions—one of these being the necessity for the licence on the ground of public interest. The carrying into effect of such a condition as this would undoubtedly restore to the railways much of the traffic which they should have, and would at the same time leave more room on the roads for those who are bound to use them. It will be noted that the suggestion is that licences should be granted on grounds of "public" interest, not "private" interest.

So much for the road traffic side of the question. What of the railways? The General Manager of the North-Eastern Railway Company, Sir Ralph Wedgwood, has supplied an answer: "Unless the railways are shortly able to secure fair and proper treatment as regards the uneconomic competition they now have to meet from road transport, it will be necessary for them to impose far higher freight charges upon those classes of merchandise the bulk of which must travel by rail. These would include coal, iron and steel, agriculture, &c., the basic industries of the country." This is an old remedy which in industry often proves worse than the disease, and it is one which has ill-served many who have adopted it in the past. However crowded the roads may be, there is still plenty of room on the water, and no doubt it would be practicable for a further portion of the threatened classes of merchandise to be transported by that means.

CORRESPONDENCE

Intermittent Vertical Chambers

SIR,—I have lately been reading (I fear rather belatedly) the technical matter contained in some of your back issues, and have observed in particular your editorial comment under the heading "Time's Changes" in your issue of Jan. 6.

This has drawn my attention still further back to the paper actually given by Mr. Grogono on the intermittent vertical chamber plant, built at Croydon by our esteemed competitors Messrs. Woodall Duckham.

I should not have referred to either of these, but in perusing Mr. Grogono's paper I note the following statement:

> The next step was to obtain a plant which would be built of British materials and entirely by British labour, and it was decided to place the order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd.

Any reader would obtain from this the impression that competing plants which were tendered for were not British.

Our subsidiary Company, "Chamber Ovens, Ltd.," who like ourselves never had a foreign shareholder (nor any nominee of such), happened on that occasion to be the chief competitor, and they made quite clear in their tender that an entirely British plant was offered. In the British Empire we build nothing else.

Moreover, Mr. Grogono, in replying to the discussion, makes the following remarks:

> The only point about the Croydon plant was that it was the first to embody bottom gas offtakes, and was specially designed to carbonize Durham coal.

This is not correct.

The first intermittent vertical chamber plant to have bottom gas offtakes was the C.O.L. plant at Wandsworth, which was started to work in the spring of 1928. The bottom offtakes there worked for some time, but, being a first design, were not entirely satisfactory. This has since been modified, but Chamber Ovens, Ltd., were the first people to install this accessory equipment, and every plant erected by them, or by this Company, has been provided with successfully operating bottom gas offtakes.

In the discussion, it is twice mentioned that three papers on intermittent vertical chambers have been given, but apparently the gentlemen concerned have forgotten the first important article in your "JOURNAL" by Mr. Croft, the General Manager of the Wandsworth and District Gas Company, on the first large intermittent vertical chamber plant in this country—namely the 3 million C.O.L. plant at Wandsworth.

This will be found in the "JOURNAL" of July 31, 1929.

It is satisfactory to note, however, that the results of the three plants described in the papers referred to at the meeting entirely confirmed the information previously given by Mr. Croft, in reference to his first plant.

Since that date a second 3½ million C.O.L. plant at Wandsworth has come into satisfactory operation, and is giving results quite up to those quoted, while the first 5-million C.O.L. plant at the Brentford Station of the Gas Light and Coke Company has also been successfully started, and the second—a repeat order—is now being erected.

Your readers might perhaps be interested to note that among the plants built by this Company are found the three methods of heating—viz.,

(1) With outside mechanical producers.
(2) With outside step-grate producers.
(3) With self-contained producers.

All these are working successfully.

For Gas Chambers and Coke Ovens, Ltd.,
ARTHUR H. LYMN,
Managing Director.

Artillery House,
Westminster, S.W. 1,
Jan. 28, 1932.

PERSONAL

MR. JOHN WILKINSON TO BE HONOURED.

We hear that a complimentary dinner and presentation are contemplated in honour of Mr. John Wilkinson, who for nearly 20 years rendered such conspicuous service to the Gas Department of the Nottingham Corporation.

Sir John Ferguson Bell, of Derby, and Sir Albert Ball, of Nottingham, are taking a keen interest in the matter, and would welcome the co-operation of any of Mr. Wilkinson's friends who have not received an official invitation. Any requests from those who would like to be associated with the function, which will take place early in March, should be addressed to Alderman A. R. Atkey, J.P., 11, Park Valley, Nottingham.

RETIREMENT OF MR. J. T. RANDALL.

Warm tributes were paid to Mr. J. T. Randall, the retiring Secretary of the old Southend Gas Company, when the staff of the Company made a presentation to him at the offices in York Road, on Saturday, Jan. 16, as a mark of their esteem and affection.

Mr. J. Hooker (Chief Station Clerk) presided at the ceremony and others of the forty officers and members of the staff present were: Mr. George Brooks (Chief Collector), Mr. C. C. Smith (Chief Inspector, Auto-Meter Department), and Mr. F. Gower (Sales Manager). Mr. T. F. Canning, late Engineer and Manager to the Company, was also present.

Mr. Hooker said they had met together to say good-bye to their old chief, who, for over 38 years, had served the Company so faithfully and loyally. By his retirement they had lost a friend, in fact, a father, whom they could not replace. They would all wish him a long life and a happy one in his retirement.

Mr. Brooks, as the oldest staff officer, then asked Mr. Randall to accept from the staff an eight-day grandfather clock as a token of the esteem and affection in which they held him. He also asked him to accept for Mrs. Randall a silver revolving breakfast dish as a mark of their appreciation of the interest she had taken in the social activities of the Company.

Mr. Canning associated himself with all that had been said about Mr. Randall. The Company owed a great deal to Mr. Randall, who had seen it pass through many difficult times.

Mr. Randall acknowledged in feeling terms the gifts and the remarks that had been made. He would always look back, he said, upon his happy associations and experiences with the Southend Gas Company and the past and present members of its staff. He deeply appreciated their kindness to him, not only in the gifts, but in the many tokens of goodwill he had always received from each individual member of the Company.

After fifty-five years' active service with the Metropolitan Gas Company of Melbourne, Mr. A. E. BRADSHAW, Secretary to the Company, retired on Dec. 31 last. He is succeeded by Mr. R. C. EVANS, who has been Assistant Secretary.

OBITUARY

MR. A. C. YOUNG.

A highly esteemed public official in Arbroath, Mr. Alexander C. Young, Manager of the Gas-Works, died on Jan. 25 after a somewhat prolonged illness. Since his appointment in 1901, Mr. Young had established a reputation for energy, enterprise, and skill in the Department under his charge, and, further, by his kindly and genial disposition had gained the regard of all associated with the municipal service, of the employees at the gas-works, and of a wide circle of friends in the town.

Mr. Young, who was in his sixty-ninth year, was a native of Perth, and was educated at Perth Academy. As a youth he served his apprenticeship in the business conducted by his father, who was a gasfitter, and this experience was of value to Mr. Young in the profession which he subsequently followed. He received a thorough training in the processes connected with the manufacture of gas and in the administrative duties at Perth Gas Works. In 1888 he was appointed to the position of Manager and Treasurer to the Auchterarder Gas Light Company, and this position he occupied for seven years. During that period he erected at Auchterarder a Peebles oil gas plant, and introduced various economies which led to reductions in the price of gas. Maybole Gas Company, Ltd., appointed him Manager of their works in June, 1896, and his technical ability was further shown there by the many

important improvements which he effected. Sixteen months later Mr. Young went to Kelso as Gas Manager and Engineer, and there his work was again eminently successful.

He went to Arbroath in 1901, therefore, with a considerable reputation as a capable engineer and executive official. During the thirty years he had control of the gas undertaking in the burgh that reputation was enhanced. The gas-works were entirely remodelled and extended under Mr. Young's charge, and among the many improvements which he introduced was the installation of the vertical retort system. Deceased is survived by his widow and family of three sons and two daughters. One son, Mr. Alex. Young, is Gas Manager at Bridge of Allan.

THE NEWS OF THE WEEK

A 10 P.Ct. Reduction in the price of gas has lately been made by the Municipal Gas-Works of Berlin.

The Ideal Home Exhibition this year will be held at Olympia from April 5-30, and it promises to be more than ever attractive.

East Surrey Gas Company.—At a Board meeting held on Jan. 30 the Directors decided to recommend dividends for the half-year ended Dec. 31, 1931, at the following rates per annum respectively: 6 p.ct. on the cumulative preference; 5½ p.ct. on the preference "A" stock; and 5¾ p.ct. on the "B" ordinary stock, all less income-tax.

Tottenham and District Gas Company.—The Directors recommend the payment of dividends in respect of the half-year ended Dec. 31, 1931—viz., at the rate of 5½ p.ct. and 5 p.ct. per annum respectively on the preference stocks; and £6 15s. p.ct. per annum on the ordinary stock; all less income-tax. The annual meeting will be held on Feb. 23.

British Industries Fair.—More and more men connected with the Gas Industry appear to make Leamington their headquarters while they are attending the British Industries Fair. Mr. W. J. Leist, Spa Manager, will always be pleased to advise as to suitable accommodation, transport, &c. There is a very good train service between Leamington and Birmingham, and it is 20 miles from Leamington to Castle Bromwich by road.

Gas Light and Coke Company.—The accounts of this Company for the past year show that the balance to the credit of the net revenue account will enable the Directors to recommend the payment of dividends for the half-year to Dec. 31 last as follows: On the 4 p.ct. consolidated preference stock at the rate of £4 p.ct. per annum; on the 3½ p.ct. maximum stock at the rate of £3 10s. p.ct. per annum; on the ordinary stock at the rate of £5 12s. p.ct. per annum; carrying forward to the next account the sum of £139,121 1s. 11d.

Increased Storage at Tunbridge Wells.

A new gasholder recently erected at the Tunbridge Wells Company's works provides the additional storage necessary to meet the ever-increasing demands for gas, and ensures an uninterrupted supply to their 15,000 consumers.

No addition to storage had been made since the year 1910, although the annual output increased from 325 million c.ft. to 607 millions, or 87 p.ct. The maximum daily output during the same period increased from 1,393,000 to 2,552,000 c.ft., or 83 p.ct. approximately.

The new holder, of the spiral-guided type, is 140 ft. in diameter, and, when fully inflated, contains 1½ million c.ft. of gas It is constructed in three lifts. The whole of the work, including the excavation for the foundation, was completed in twelve months, and the gas from the holder was turned on to the town by the Chairman of the Company, Mr. Harold A. Beeching, in December last.

The construction and erection were carried out under the Company's General Manager and Engineer, Mr. L. J. Langford, by Messrs. Saml. Cutler & Sons, Ltd., of Millwall, London, and the foundations by the F.C. Construction Company, Ltd., of Derby.

The Prince of Wales and Sir Francis Goodenough.

We noticed with interest in the Court Circular of Jan. 21 that Sir Francis Goodenough was received at St. James's Palace on the morning of that day by H.R.H. the Prince of Wales.

Following that visit, the Press have been informed that the Prince has consented to be Royal Patron of the fifth triennial International Congress on Commercial Education, which is to be held in London from July 25 to 29 next, and to attend and address its closing session.

His Royal Highness has also, we learn, consented to attend and address the opening session of the Annual Conference of the Incorporated Sales Managers' Association, which, on the occasion of the 21st anniversary of its formation, is being held in London from May 20 to 23 next.

Smoke Abatement.

In view of the gravity of this question in relation to smoke abatement generally and the desirability of directing further attention to it with a view to the necessary action being taken, the following resolutions have been adopted by the Council of the National Smoke Abatement Society:

(1) That local authorities be urged to combine for the purpose of setting up suitable statutory regional organizations for the administration of smoke abatement law.

(2) That, pending the formation of statutory regional organizations, local authorities be urged to establish advisory committees similar to those already in existence; and

(3) That the support of the National Smoke Abatement Society be given to such projects as will further these proposals.

Society of British Gas Industries.

A Meeting of the Council was held at 56, Victoria Street, Westminster, S.W. 1, on Jan. 21. Those present were: Messrs. Frank West, C. A. Goodall, D. W. Turner, Geo. Clark, T. F. C. Potterton, E. J. Fox, F. J. Gould, H. E. Bennet, W. H. Handley, W. J. Gardner, B. B. Waller, E. J. Davison, and A. L. Griffith, Secretary.

In the unavoidable absence of the Chairman, Dr. E. W. Smith, Mr. Frank West, immediate-Past Chairman, took the chair. Apologies for absence were reported from: Dr. E. W. Smith, Col. E. A. Wilson, Messrs. A. Comley, T. O. Wilton, L. Hartley, F. C. Tilley, R. J. Milbourne, John Orme, and H. M. Thornton.

The Chairman referred with regret to the death of the following members:

Sir Henry Cowan, Chairman of Parkinson & Cowan, Ltd.

Mr. Percy E. Beaumont, Head of W. G. Beaumont & Son.

The members rose in their places as a mark of sympathy. Letters of condolence had been sent by the Secretary.

A donation of two guineas was voted to the London

THE NEWS—*continued.*

Chamber of Commerce in support of their Commercial Education Fund.

A letter was read from Mr. H. C. Head, Managing Director of the Winchester Water and Gas Company, in reference to English manufacturers investigating the possibilities of putting down plant to produce glass in connection with gas lighting which will compete with and prove as satisfactory as that supplied by our foreign competitors.

It was arranged to bring the matter before the manufacturers concerned.

It was reported that a letter had been received from the Canadian Gas Association inviting the Society to send a delegate to the 25th Anniversary Convention to be held in Winnipeg on June 9 and 10, 1932.

The Society was represented at the preliminary meeting in London, on Jan. 12, of the proposed National Federation of Associations of Specialists and Sub-Contractors, which was largely attended and representative of the interests concerned. It was decided to form a new body to be called "The National Federation of Specialists and Sub-Contractors."

The Annual General Meeting was fixed for May 26, in London, when the President, Lord Eustace Percy, M.P., will preside and give an Address.

"Seize a Caoutchouc Hose."

This is the effort of a Frenchman writing instructions in "English" for the construction of apparatus which required the use of a piece of rubber tubing.

Such absurdities of mistranslation can be something more than a joke. To the business man it can and does mean loss of trade. To the manufacturer and his scientific and technical staff it can mean waste of time and expensive mistakes. Translation is not as simple as taking bricks out of one cart and putting them into another. It is beset by pitfalls, and reliable translations can be made only by those who are expert not merely in the languages concerned, but also in the subject matter of the work.

There has always been difficulty in finding competent translators, but the establishment of the Aslib Panel of Expert Translators by the Association of Special Libraries and Information Bureaux goes a long way to solve it. The range of languages and special subjects covered by this service is now very wide. This service was established to meet a well-known difficulty and is not run for profit.

Long Periods of Service at Stourbridge.

An interesting ceremony took place on Monday evening in the New Road Showrooms of the Stourbridge Borough Gas Department, when the office staff and fitters attended to mark their appreciation of their two oldest colleagues—Mr. E. Tombs, of South Avenue, and Mr. J. R. Perks, of Ridge Street, Wollaston, who have recently retired from positions in the Department extending respectively to 64 years and 52 years.

Mr. C. H. Webb, Works Engineer and Manager, presided, and in appropriate terms referred to the splendid and very long services Mr. Tombs and Mr. Perks had rendered. He spoke highly of the spirit of co-operation they had constantly exhibited during the periods of their employment, and reviewed the stages through which they had passed. He asked Mr. Tombs to accept as a slight token of their high esteem an oak barometer, and, with similar felicitations, he presented to Mr. Perks an oak bureau, and expressed the hope that they would long live to enjoy the retirement they had so well deserved.

The making of the presentations was greeted with loud applause, and Mr. Tombs and Mr. Perks made suitable responses.

Bristol Company's Extensions.

The Directors of the Bristol Gas Company have just completed an important property purchase. They have acquired the extensive premises formerly occupied by Messrs. Hunt & Phillips in North Street and Barton Street which have been vacant for some time.

The premises, which are in one of the best shopping centres of Bristol, have been purchased for extensions of the Gas Company's repairs and maintenance cooking stove and meter workshops, rendered necessary by the enormous growth and development of their business. The property bought extends in depth to the Gas Company's present works in Barton Street.

The Gas Company's meter and cooker workshops in Barton Street were opened in February, 1926, for the repair and maintenance of cookers and meters. The business of the Company has undergone a considerable expansion since that time, and actually there has been an increase of 24,000 consumers since 1925 and a similar number of additional cookers have been issued. The work done at the repair shops includes bringing the cookers and other appliances up to date. They are thoroughly modernized by scientific means and between 60,000 and 70,000 cookers have already been treated in this way.

South Suburban Children's Party.

A hundred and sixty children of Bromley employees of the South Suburban Gas Company spent a happy evening at the Church Hall, Elliott Road, Bromley, on Jan. 23, when they were entertained by members of the Suburbagas Social and Athletic Club at a party.

The guests comprised 85 boys and 75 girls. Among those present were Mr. F. G. Gorman, Vice-President of the Club, and Mrs. Gorman, and Mr. and Mrs. A. W. Tweed.

The hall had been decorated by Mr. G. Baker with flags, bunting, and paper chains lent for the occasion by Mr. G. Pyrke. Full appreciation was shown of an excellent tea, and afterwards the children settled down to a round of amusement lasting three hours. One of the most popular features was the slide specially constructed by members of the club.

Messrs. T. H. Ead and J. Serle entertained the youthful audience with an exhibition of conjuring and ventriloquism, and community singing was led by Mrs. Brown, with Mrs. Isard at the piano. Mr. J. Butler, senr., made a popular appearance as Father Christmas, and gave a present to each child.

The Committee in charge of the arrangements comprised Messrs. W. M. Judd, Treasurer and Chairman, J. Isard, Secretary, F. Ancell, G. Manley, W. C. Crandley, K. Genge, F. Moyce, J. Butler, C. Knight, and W. Brown.

A Lecture on Meters at Bingley.

"The Construction of Gas Meters" and how to deal with complaints arising from defective meters, was the subject of a lecture before the Distribution Staff Circle of the Bingley Urban District Council Gas Department, on Thursday last, at the Bingley Gas Showrooms, by Mr. A. T. Gilbert, Technical Adviser to Messrs. Willey and Co., Ltd., Gas Engineers, of London and Exeter.

Members of the distribution staffs of other gas undertakings in the neighbourhood were invited, and a good attendance followed the lecture closely; which aroused a good discussion; several questions were asked which the lecturer answered.

A vote of thanks was proposed by Mr. J. B. Balmforth, Gas Engineer, Bingley, to Messrs. Willey & Co., Mr. A. T. Gilbert, and to Mr. J. Fletcher, their Representative, and seconded by Mr. John Roberts, Assistant Manager of the Bingley Gas Department, to which Mr. Gilbert and Mr. Fletcher suitably responded.

Gas Department's Essay Competition.

A pleasing ceremony marked the presentation, at the Smethwick Gas Department Showrooms, on Wednesday, Jan. 27, of the prizes given in the essay competition organized by the Gas Committee in the schools of the Borough.

The Mayor (Alderman Mrs. E. M. Sands) presented the prizes, and commended the scheme as encouraging the scholars to take an interest in the town's industries, and particularly in that which was owned by the people themselves.

Alderman Williets, J.P. (Chairman of the Gas Committee), welcomed the prize-winners and their parents, together with several head teachers. He gave the children an address on the value of the competition, and some admirable counsel for their future careers.

The competitions were organized in connection with the Jubilee of the Smethwick Gas Undertaking. The girls in the schools of the Borough were invited to write an essay on the window displays at the Showrooms during the Jubilee, which coincided with Carnival Week. The scenes illustrated 200,000 years of progress in heating and lighting.

The boys' essays described a visit to the Gas-Works, Rabone Lane.

In addition, there were presented on this occasion the prizes won by Smethwick children in the "Fairy Gas" Competition organized by the British Commercial Gas Association. In 1931, 21,000 children entered for this

annual competition, in which two £50 scholarships are the highest awards.

The Chairman presented the prizes to the children, and in doing so urged them to continue their education after their schooldays, for in that way they would achieve greater things both in their work and in their life at home.

The Romance of a Lump of Coal.

The fourth lecture given at Hastings by Mr. W. T. Dunn, M.I.Mech.E., formerly Secretary to the Institution of Gas Engineers, was recently delivered before an appreciative audience, Mr. C. Maxwell, M.D., presiding.

Mr. Dunn took for his subject on this occasion "The Romance of a Lump of Coal." With the aid of an excellent series of lantern slides, over seventy in number, he described the process of coal formation from the primeval forest vegetation; colliery mining operations; surface machinery, including winding engines, power-house, and lamp room; pit bottom, pumping plant; ventilation; and system of mine workings, with plan of pillar and stall working.

All the processes of gas manufacture, storage, and distribution, were then illustrated, and reference was made to the thousand and one applications of gas, domestic and industrial. The dye derivatives of coal tar were touched upon, as was also the value of ammonium sulphate for fertilization. The production of disinfectants having their source from coal was discussed. The sandwich system invented by Mr. E. W. Nicol, of the London and Counties Coke Committee, for utilizing a mixture of gas coke and inferior coal was illustrated, its high value to the electrical engineer being dwelt upon.

Acknowledgment was made of the assistance which the lecturer had received through the courtesy of those who had lent slides, &c: The Mining Department of the University of Birmingham, the British Commercial Gas Association, Messrs. Babcock & Wilcox, the London and Counties Coke Committee, and the Hastings and St. Leonards Gas Company.

The Progress of a Great Public Service.

In a special supplement published on Feb. 1, the "Daily Telegraph" presented a survey of a remarkable organization—municipal administration in London.

A very fine piece of propaganda on behalf of the Gas Industry was achieved by the British Commercial Gas Association in taking the whole back page for the purpose of describing and illustrating in a most interesting and comprehensive article the ever-increasing part the Gas Industry plays in the nation's life to-day. It has actively concerned itself with the problems of town-planning and housing; the provision of light, heat, and power; and the safeguarding of the public health. By organizing itself down to the last detail to fulfil its responsibilities as a great public service, the Gas Industry has more than doubled its output since 1902.

The article mentions at the outset the Industry's work in fighting the smoke evil, the direct damage done to property in this country by which is estimated at £80,000,000, and in London alone at nearly £7,000,000, and this not taking into account the vast additional expense occasioned by the sickness and ill-health brought about by smoke.

Gas and Housing.

The contribution of the Gas Industry to housing is next reviewed, where the question of domestic fuel in labour-saving dwellings is obviously of first rate importance. It is significant that in the vast majority of housing schemes, from Glasgow to Bournemouth, gas has been chosen as the fuel best fitted to meet these needs. As an example the case of Birmingham is cited, where, since 1919, the Corporation have completed over 36,700 houses, and every one of these has been piped for gas. In all the later houses gas points have been provided for a cooker, a wash-boiler, and either two or three gas fires.

In estates of small houses built by municipal authorities in London a common practice is to provide, as a minimum, gas supply points for a cooker, one or two gas fires, and a wash copper, while in many cases the lighting is also by gas. An illustration indicates a typical all-gas scullery in a privately owned estate at Egham, where a gas cooker, wash-boiler, iron, and lighting fitting are in evidence, the neat and compact appearance of the appliances being apparent.

Research and progress in gas lighting also receives attention, two fine photographs showing respectively the magnificent illumination of Whitehall, London, and Victoria Square, Birmingham, which reach the highest standard of lighting laid down by the British Standards Institution. In 318 towns investigated 13,341 (80 p.ct.) out of 16,559 miles of streets are lighted by gas.

A final section is devoted to a review of the growing demand for gas as a heating agent in schools, institutions, and public buildings, the equipment of which is naturally of interest to all municipal bodies. Central heating, panel heaters, water heating, and gas for large-scale lighting and interior lighting all receive attention.

An Interview with Sir David Milne-Watson.

In the course of an interesting interview with a "Daily Telegraph" representative, the views of Sir David Milne-Watson on the state of the Industry to-day were set forth on another page of the supplement.

"I think the work we have done in schools under the London County Council in the last few years will be of special interest to municipal authorities," remarked Sir David. "Complete installations of modern gas fittings for lighting purposes have been put into 205 L.C.C. schools, and, in addition, a large number of partial re-lighting installations have been carried out. On one L.C.C. estate 22,400 houses had been erected by the last day of 1931; 16,700 of these are lit by gas throughout, while all the rest are partly gas-lit. Gas cookers and gas fires have been installed in every house, and more than 2000 gas-fired water-heaters have been fixed on this estate. The gas refrigerator is relatively new to this country, and it is one of those things which women are going to regard more and more as a necessity. £1,000,000 worth of gas refrigerators were sold in New York last year.

"Gas sales have," concluded Sir David, "gone up in Great Britain nearly 25 p.ct. in the last ten years, and in America 110 p.ct. over the same period. Three thousand industries in Great Britain use gas, and the industrial load is steadily expanding."

Scottish Junior Gas Association (Western District).

Visit to Johnstone Gas-Works.

On Saturday, Jan. 23, the Association visited the Johnstone Gas-Works, where they were received by Councillor Rev. Colin Macpherson, Convenor of the Gas Committee. The visitors were arranged in small parties, and a tour of inspection was made under the guidance of Mr. Alex. Jamieson, Engineer and Manager, Mr. Walter A. Dearden, late Manager, and now Manager of the Lancaster Gas Undertaking, and other members of the staff.

The area supplied by the Johnstone Gas Undertaking includes, in addition to the Burgh of Johnstone, Elderslie (birthplace of Sir William Wallace), Brookfield, and Howwood, thus increasing the population supplied to approximately 16,500.

The Johnstone Gas-Works, which first came into being in 1824 as the property of a private Company, were bought by the town in 1879 at a cost of £22,000. At that time the annual make of gas was 19 million c.ft. The annual make last year was 142 millions, which figure almost represented the total output obtainable from the Wilson vertical retort bench. As considerable resetting was necessary, the late Engineer, Mr. Dearden, submitted a report to the Town Council recommending the reconstruction of the retort bench to give a bigger output, complete with waste-heat recovery plant, electric hoist, and coke storage hoppers. The report was adopted, and the work entrusted to Messrs. West's Gas Improvement Company, Ltd., the scheme including the demolition of eight of the eighteen Wilson retorts, which have a daily capacity of about 40,000 c.ft. (425 B.Th.U. per c.ft.) per mouthpiece, and then replacement by six 50-in. "New Model" Glover-West retorts capable of a total nominal daily output of 600,000 c.ft.

Coke is handled by the Wilson gravity-bucket conveyor to the overhead bunkers, which have been modified to suit the new arrangement of retorts. Coke for producers is also handled by this conveyor to the storage hopper provided.

An electric hoist of 30 cwt. capacity was installed and is arranged to elevate coal to the overhead bunkers, and coke to the producer feed hopper and outside storage hoppers, so that the hoist provides a stand-by means of handling coal and coke. The outside storage hoppers were installed as a means to serve railway wagons, carts, &c., conveniently and quickly, with screened coke.

The waste-heat boiler is of the Spencer-Bonecourt natural draught, smoke tube type, fitted with automatic water feed and "Hilo" water alarm. The coke extractor gear is operated by two Marshall steam engines, one to act as stand-by to the other, suitably enclosed in an engine house.

Since the introduction of the waste-heat boiler practi-

THE NEWS—continued.

cally the whole of the steam required for use in the retorts and the entire works has been generated by waste heat, which has obviated the use of coal or saleable coke on the works boilers. The scheme increases the capacity of the plant by approximately 100 p.ct., on equal ground area—an important factor, as in this case no further space for extension was available.

After the inspection the members were entertained at tea in the Town Hall, Johnstone.

A hearty welcome was extended to the Juniors by the Provost, who expressed the hope that they would again visit Johnstone.

Councillor Macpherson, Convenor of the Gas Committee, in expressing their pleasure, offered fine encouragement to the visitors.

Mr. Alex. Macdonald (President), in returning thanks, complimented the Burgh on their excellent selection of Gas Engineers.

Among those present were Mr. D. Fulton (Helensburgh), Mr. James Jamieson (Edinburgh), Mr. J. Frazer (Glasgow), Mr. R. Keillor (Greenock), Mr. Luck (Carluke), Mr. D. Melvin (Uddingston), Mr. A. Walker (Kilbarchan), Mr. J. Blair (Lochwinnoch), and Mr. W. Mitchell (the Burgh Surveyor, Johnstone).

South Metropolitan Gas Company.

Increase in Sale of Gas.

The following is the report of the Directors for the year ended Dec. 31, 1931, which will be presented at the ordinary general meeting on Feb. 10, 1932:

During the past year the number of consumers has increased by 2754 and the sale of gas by rather more than ¾ p.ct.

The manufacturing and distributing plants have been maintained in an efficient condition; the yield of gas and products has been satisfactory, and the unaccounted-for gas is again below 1 p.ct.

The market for tar has hardened, but owing to over-production a serious fall has taken place in the selling price of sulphate of ammonia. At the present time the cost of manufacturing sulphate of ammonia exceeds the revenue obtainable by its sale.

The quality of coke has been improved appreciably in recent years, and the demand for the better product is an increasing one. The manufacture and sale of " Metro-Coalite " commenced in the latter part of the year.

The profit for the year provides for the payment of a dividend at the rate of 6 p.ct. per annum, less the 2½ p.ct. paid in September last.

The approval of the proprietors will be asked to a Bill, to be presented to Parliament, authorizing an extension of the Company's capital powers; the re-adjustment of charges for the rental of fittings and appliances supplied to slot meter consumers; and for other purposes.

The sum of £734,000 6½ p.ct. debenture stock was redeemed at par in September, and provision is made in the present accounts for the discount of £22,020 on the issue. The investments on account of the reserve fund have been written down by £34,285.

CHARLES CARPENTER, *President.*

City of Perth (Australia).

Annual Report of Gas Department.

The report on the working of the City of Perth Gas Department for the year ended Sept. 30, 1931, shows that the quantities of gas manufactured and sold were as follows:

	1931. C.Ft.
Gas manufactured	337,622,000
Gas sold	315,894,800

The average quantity of gas made per ton was 18,996 c.ft., as against 13,817 c.ft. The heating value of the gas supplied was 461 B.Th.U. The maximum output of gas in 24 hours was 1,141,000 c.ft., as against 1,158,000 c.ft. The number of meters in use increased from 16,278 to 16,359; or 81 for the year. The mains laid during the year totalled 9806 yards, and the total length of mains laid to date is 280,371 miles.

A comparison of revenue for 1930-31 is as follows:

	1930. £	s.	d.		1931. £	s.	d.
Total receipts	437,087	9	0	..	409,390	4	2
Gross profit	107,552	5	0	..	111,299	0	8

Interest and sinking fund charges have increased by £4125, and total £80,452, leaving for allocation the sum of £30,846. Deducting from this the sum of £9314 for street lighting, and £14,000 contribution to general revenue, leaves a balance of £7531, which is carried to reserves for use in the Department. The amount contributed by this Department to loan repayment totals £443,137. Of this amount, £288,899 represents redeemed debentures, and £154,238 represents contribution to sinking fund.

Potential Investments.

[Extracted from the "Financial Times."]

Harrogate.

The Company was incorporated in 1846 and re-incorporated by Special Act in 1863.

At the close of 1927 the gas undertakings of the Knaresborough Urban District Council, the Tadcaster and Wetherby District Gas Light Company, the Boston Spa Gas Company, and the Boroughbridge Gas Light Company were purchased at a cost of £50,617. Since then numerous adjacent parishes have been included in the statutory area of supply, making a total of 45, in addition to the boroughs of Harrogate and Knaresborough, and comprising some 200 square miles.

In addition to the capital raised to finance these extended areas, considerable sums have been spent in pursuing an enterprising programme of publicity.

For nine consecutive years the maximum dividend of 10 p.ct. has been paid on the consolidated ordinary stock, and on account of 1931 the half-year's distribution at the same rate was paid last September. The year's dividend requires £16,155, which is exceeded by the carry-forward.

Long Eaton.

The Long Eaton Gas Company was registered as limited in June, 1864, and incorporated by Special Act in 1901. At the end of 1922 the undertaking of the Draycott Gas Company was acquired. The statutory area of supply includes Long Eaton and a number of adjacent towns, covering some 32 square miles.

For some years both sales of gas and gas-using appliances have continued to increase, necessitating the construction of new buildings, plant and mains, and the provision of more meters, cookers, and fires. The standard price of gas is fixed at 15·8d. per therm for " A " stock and 13·8d. per therm for " B " stock. The price at the close of 1930 was 9d. Dividends on both classes are subject to the usual sliding-scale.

On account of the year 1931, interim dividends of 2½ p.ct. and 2 p.ct. on the " A " and " B " stocks respectively, as before, were paid in August.

Mid-Kent.

The Mid-Kent Gas-Light and Coke Company was incorporated by Special Act in 1899, and its statutory area of supply comprises Snodland, West and East Malling, Marden, Wrotham, and elsewhere. The statutory fixed standard price of gas is 16d. per therm, and the present price 15d. Ordinary dividends are subject to the usual sliding-scale.

In March, 1927, the price of gas was reduced by 2d. per therm to the level existing before the coal stoppage, and from March, 1931, a further reduction of 0·6d. per therm was allowed, making the rate 15d. per therm.

On account of 1931 the usual interim dividend of 2 p.ct. was paid in September. The total amount of the authorized share capital is £140,000, of which £111,370 is issued and paid up. Borrowing powers are one-half the paid-up capital, of which there is exercised and outstanding £24,150 mortgage bonds at 4½ p.ct. and 6 p.ct.

Oxford.

The Oxford and District Gas Company was incorporated by Special Act in 1918 as the Oxford Gas-Light and Coke Company, and the name was changed in 1930 on the acquisition of the undertaking of the Abingdon Gas-Light and Coke Company. The area of supply is about 110 square miles, comprising the city of Oxford, the Borough of Abingdon, and numerous adjacent villages and districts.

In recent years the demand for gas, cooking stoves, fires, and other heating appliances has been constantly growing, and rendered necessary additional capital for extensions of works, plant, mains, &c. The last issue was £51,000 of 5 p.ct. perpetual debenture stock in March, 1931, at a minimum of 98, and the average price realized was £99 8s. 11d.

The standard price of gas within the city is 13·2d. per therm. Several reductions have been made since 1926, and the rate at the end of 1930 was 8·4d. per therm. The dividend on the 5 p.ct. standard consolidated ordinary stock is subject to the usual sliding-scale, and has been maintained at 10 p.ct. per annum since March, 1924.

On account of 1931 the usual interim dividend of 5 p.ct. was paid in September.

Borrowing powers are one-half the paid-up capital stock. The total exercised and outstanding is £160,179, made up of 4 p.ct., 4½ p.ct., and 5 p.ct. mortgage for £10,880 and 4 p.ct and 5 p.ct. debenture stocks for £149,299. The 5 p.ct. stock is quoted at 95 and gives a return of 5¼ p.ct.

Rhymney and Aber.

The Rhymney and Aber Gas Company was incorporated by Special Act in 1898 as the Rhymney and Aber Valleys Gas and Water Company, but the name was changed in 1922 on the transfer of the water undertaking to the Rhymney Valley Water Board. The statutory area of supply covers some 60 square miles, including Rhymney, Aber Valley, Caerphilly, and several adjacent villages.

The statutory fixed price of gas, as long as the Company does not itself manufacture the gas supplied, is 11·3d. per therm within the urban district of Rhymney and an adjoining village

and 12·7d. in the remainder of the area. Ordinary dividends are subject to the usual sliding-scale, and the standard dividend authorized has been maintained at 7 p.ct. since 1922. At the end of 1930 the prices of gas were 10·8d. and 12·2d. respectively.

Supply is taken in bulk from the coke ovens of the Bargoed Colliery of the Powell Duffryn Steam Coal Company, and the undertaking consequently produces no residual products. The reports do not disclose the quantity of gas consumed, but the gross revenue shows a progressive yearly increase, while revenue expenditure has remained practically stationary.

On account of 1931 the usual interim dividend of 3½ p.ct. actual was paid in September.

Swansea.

The Swansea Gas Light Company was incorporated by Special Act in 1830 and re-incorporated in 1861 for the purpose of supplying Swansea and Llangyfelach. Except for a temporary restriction of the rate to 3¾ p.ct. during the three years to 1920, the basic dividend of 5 p.ct. has been paid on the ordinary stock since 1855. The Company's Act of 1921 fixed the basic price of gas at 15·4d. per therm, and at the end of 1930 the price was 11·9d. Dividends are subject to the usual sliding-scale.

In recent years the undertaking has been subjected to the industrial depression, which resulted in either the closing down or restricted working of collieries and iron, steel, and tinplate industries. In the face of these the Company has maintained very satisfactory earnings, and possesses, therefore, high potentialities for a greatly increased output once conditions permit the resumption of normal consumption.

On account of 1931 the usual interim dividend of 2½ p.ct. was paid in September.

Uxbridge.

The Uxbridge, Maidenhead, Wycombe, and District Gas Company was established in 1854 as the Uxbridge and Hillingdon Gas Consumers' Company, and was incorporated by Special Act in 1861. Further powers were obtained subsequently which authorized the acquisition of the undertakings of the High Wycombe, Eton, Great Marlow, and Maidenhead Gas Companies. The statutory area of the combined concerns now covers about 245 square miles, and the Company supplies some 36,000 consumers through 333 miles of mains.

The exceptional travelling facilities enjoyed by the district continue to attract a large residential population, and considerable development is taking place in many parts, bringing a constantly increasing demand for gas and appliances.

Dividends on the ordinary stock are subject to the usual sliding-scale, and are variable to the extent of 2s. 6d. p.ct. per annum for each increase or reduction of ⅛d. per therm in the price charged above or below the standard price of 15½d. The selling price at March last was 12d. per therm, and dividends have increased from 6½ p.ct. in 1926 to 7 p.ct. since the first half of 1928.

On account of 1931 the usual half-year's dividend of 3½ p.ct. was paid on Aug. 31.

Doncaster Coalite, Ltd.

The report of the Directors for the financial year ended Dec. 31, 1931, states that during the year the works operated 24 hours per day for 365 days, and a new record was established for throughput and regularity of operation.

The sales of "Coalite" smokeless fuel, coal petrol, coal oil, &c., reached a figure of £85,057, being an increase of about 60 p.ct. on the previous year. The demand for the Company's products exceeded the production, and the total stock at the end of the year was less than three days' output.

The works profit for the year amounted to £25,788, equivalent to 6s. 10d. per ton of coal carbonized. After providing for the interest on the debentures covering the cost of the plant, depreciation, Head Office charges, &c., there remained a net balance of £6415 to be carried to the balance-sheet. It is proposed to increase the capacity of the works as soon as possible.

ON THE ELECTRICAL SIDE

Visiting Demonstrators.

Making a strong plea for the provision by electricity undertakings of women visiting demonstrators, Miss C. Haslett, in a lecture on "Economic Domestic Electricity," said that the bogey of the expense of electricity is unfortunately justified in many areas, but there are numerous instances in which the so-called costliness of electricity is entirely due to extravagant use by the consumer due to sheer ignorance. Thus efficient service is essential, and this service should include women demonstrators capable not only of showing the housewife how to make the best and most economic use of a cooker and other apparatus, but of instructing her in regard to possible difficulties and to the employment of electricity for further purposes. These visits should be frequent, but Miss Haslett would not be satisfied to stop at this. She feels that school girls must be taught to think in electrical terms, and be brought up with the idea, not that an electric cooker is a luxury or a nice thing to have, but that it is the proper and only thing. School girls who are taught how to use intelligently a gas cooker will probably find themselves more suitably equipped for the life that lies before them.

In the course of the lecture (which was to the London Technical Local Group of the E.P.E.A.), Miss Haslett exhibited a model of an all-electric kitchen, on the lines of those in the working-class flats of the St. Pancras House Improvement Society, and stated that the total cost of electricity used in these flats (the apparatus comprising kitchen equipment, bungalow fire, and water heater), including a weekly charge of 1s. 5d. for hire of the apparatus, is said to be 4s. 3d. per week. Mr. Vorley, in the discussion, expressed surprise at hearing such a low figure of cost. Another speaker said that in his own borough all-electric flats had been developed with one coal fire. The rent of the flats included a charge for the hire and maintenance of the apparatus—the rate for the current being ½d. per unit.

Three C's.

But in addition to women demonstrators there are the showroom attendants, who, as in our own industry, play a very important part. Remarks made by Brig.-Gen. Legge (General Manager of the British Power and Light Corporation) about the attendants in electricity showrooms might just as forcibly have been addressed to a gas undertaking. "Do the showroom attendants possess the three C's of salesmanship—Cheerfulness, Cordiality, and Courtesy? Have they cultivated sales initiative? There are many electrical showrooms where the appropriate equivalent of 'What else can I show you to-day?' has yet to disturb the mournful dignity of the general atmosphere. Point out to your assistants that possibly half of the people entering the showroom have one lamp or more needing replacement and a proportion still ignore the value of an electric iron. Pin a sales curve of these two articles where it can be seen by the staff. The results, in all probability, will enable you and them to turn optimistically to other methods of increasing sales. The undertaking is judged by its employees, and if the latter cannot place attractively and pleasantly before the customer the merits of that which they have to sell, they are useless. The misconduct or indifference of just one employee may undo the efforts of many others to give customers the square deal and fair treatment that they should receive."

Gas-Operated Wireless Sets.

Writing in the "Electrical Times" recently, "Meteor" asked why our industry did not introduce gas-driven wireless sets. He referred to a paragraph in the "Manchester Guardian" about an old farmer and his wife, who called on an electrical firm in Manchester and wanted to purchase a wireless set. The salesman soon found that they were prepared to pay a good price. He showed them a fairly expensive all-electric set, and illustrated how simple it was to plug the apparatus in to the electric light. It was here that the first objection arose. The farmhouse, it seemed, was not illuminated by electricity. "So tha'll have to show us one as fits on t' gas," the farmer said.

This reminds us of a description, which appeared in the "JOURNAL" (when dealing with the London Gas Exhibit at the Ideal Home Exhibition, Olympia), in 1928, of "an invention which eliminates the need of batteries for wireless sets even in districts where there are no electric cables." We then said: "In the sitting-room is a 'Marconiphone' wireless set, to which is connected a 'Thermattaix'—a device which utilizes the heat of a small gas burner to generate electrical energy. The thermo-electrical generator is made up of compound metal strips connected in series. One end of each thermo-couple is heated, while the other remains cold. The difference in the two temperatures sets up a steady flow of an electric current; and as long as the difference in temperature exists, so long will the thermo-couples generate an electric current. The gas consumption of the appliance is approximately 8 c.ft. an hour; and the electricity generated is sufficient to operate any wireless set employing modern valves of low consumption."

SPIRAL GASHOLDERS

By S. M. MILBOURNE, A.M.I.Struct.E.

A brief treatise investigating from a mathematical standpoint, as far as possible, the main loads and stresses induced in the various members which constitute the spiral guided gasholder. The determination of the actual sections required to safely withstand these loads is then a matter of arithmetical computation and practical experience in design

(*Continued from p.* 195.)

Equilibrium of Shell under Gas Pressure.

When the gasholder is inflated, the side and crown sheeting is subject to a system of primary and secondary stresses. The primary stresses are those induced by the direct action of the gas pressure on the sheeting, and are easily calculated since they result from the state of tension which exists in a thin cylindrical and spherical shell under the influence of internal pressure. The primary tensile stress (f) in a thin cylindrical shell is expressed by the equation

$$f = \frac{rp_1}{t} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

where r = the radius of the shell,
p_1 = the maximum pressure of the gas per square unit,
t = the thickness of the sheeting.

Equation (4) is correct when the length of cylindrical vessel is much greater than the diameter. In the case of a gasholder the distance between the cup rings is comparatively small, and the strengthening influence of the guides and vertical stays, as well as the cup and dip rings, tends to reduce the hoop stress in the sides of the lifts. In these circumstances it is reasonable to assume that only three-quarters the value given in (4) is actually developed. The equation for the stress (f_1) in the side sheeting of the lift may then be written:

$$f_1 = \frac{3rp_1}{4t} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4a)$$

The primary tensional stress in the crown sheeting may be stated as follows:

$$f_2 = \frac{Rp_2}{2t} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

where R = the radius of curvation of the crown sheeting,
p_2 = the maximum effective pressure of gas acting on the crown sheeting per square unit.

It will be shown later that the effect of the wind and snow load increases the stresses in the side sheeting, but so far as the crown sheeting is concerned the thickness may be determined at once by equating for t in (5) after making the necessary allowance for joint efficiency and substituting any desired value for f_2.

Now it follows from equations (4) and (5) when $R > r$ that at the periphery of the crown where the curvature (R) is rendered discontinuous the tensional pull of the

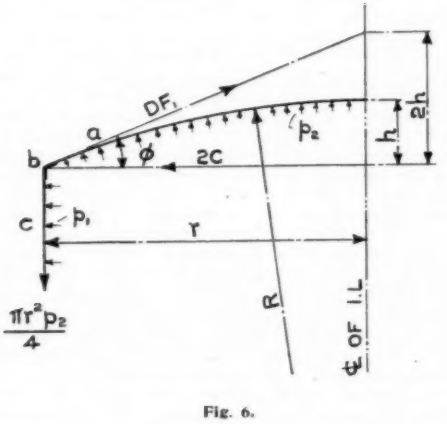


Fig. 6.

top sheets cannot be wholly resisted by the primary action of the gas pressure on the side sheeting of the holder, and it is therefore necessary to provide suitable means of stiffening the structure, in order to prevent the thin side sheeting being drawn inwards at this point.* Fig. 6 illustrates the play of the forces acting on the top curb of a gasholder. This stiffening may take the form of increased thickness of the plating in the immediate vicinity of the junction of the crown with the side sheeting, as shown in fig. 6 (*a*, *b*, *c*). In the case of the larger holders, additional angle or channel rings are usually fixed inside the bell near the main angle curb.

Now if the term t be eliminated from equation (5), the tension (F_1) per unit of circumference in the crown sheeting may be written:

$$F_1 = \frac{Rp_2}{2} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

If D = diameter of holder, then DF_1 represents the total radial pull of the crown sheeting at the top curb, resolved in one direction. The horizontal resistance of this force which occurs in the plane of the top curb is therefore 2C, where C represents the compression on one side of the holder. Resolving the force DF_1 into the horizontal and equating to 2C the following is obtained:

$$2C = DF_1 \cos\phi$$

or in terms of R and p

$$C = \frac{DRp_2 \cos\phi}{4} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

When the rise of the crown (h) is small compared with the radius of the holder, the value of $\cos\phi$ may be obtained within reasonable limits of accuracy from the expression:

$$\mathrm{Tan}\phi = \frac{2h}{r} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8)$$

As the bell of a holder is under a condition of primary tensile stress due to the internal gas pressure, it follows that the compressive load C is therefore reduced to some extent. The amount of this reduction is difficult to ascertain on account of the fact that the transmission of stress across comparatively wide stretches of riveted sheeting is complicated, and further experimental work is necessary before the stress variation can be accurately determined. Since, however, the side sheeting is firmly secured to the guide rails and vertical stays, it is permissible to allow about one-fifth of the total hoop tension on the inner lift as acting on the top curb. The compressive load on the top curb will then be reduced by an amount equal to $rp_1\, d/5$. The equation giving the total compression C_1 on the top curb of a spiral holder with an untrussed crown will then be:

$$C_1 = \frac{DRp_2 \cos\phi}{4} - \frac{rp_1 d}{5} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (9)$$

If the holder is designed with a trussed crown in preference to a framing in the tank, a further reduction in the compressive load on the top curb may be made, and is dependent upon the design of the trussing employed.*

It will be shown later that the action of the wind load on the top curb produces tensional stress in this ring; therefore, its influence is neglected so far as the compression formula is concerned.

Since the section of the structure representing the top curb is subject to a compressive load, the question as to what extent this load is appreciated by the side and crown sheeting naturally arises. It is evident that if any slight undulations are present in the thin sheeting, only a very small amount of the compressive load could be taken by this, as an immediate tendency to fail by wrinkling would be induced. In these circumstances, it is preferable to allow only the thickened plates in the vicinity of the top curb angle to resist the compression (C_1). This wrinkling tendency exists to a certain degree even in the thickened plates forming the top curb. It will be realized, however, that this tendency is much reduced, not only on account of the relatively better alignment which it is possible to achieve with the thicker plates, but also by the great increase in the value of inertia of the plate section in the vicinity of the top curb. In arriving at the area of the top curb section required to withstand the compression, it is usual to allow a stress of 6 tons per square inch of cross section when the plates are efficiently butt jointed. If any of the plates forming the curb are lap jointed, the allowable stress is lower, and necessarily varies according to the efficiency of joint employed.

* See "The Guide Framing of Gasholders," by F. S. Cripps, Assoc.M. Inst.C.E.

* See "Crown Framing of Gasholders," by the author. "Gas Journal", Oct. 31, 1928.

EQUILIBRIUM OF HOLDER UNDER SNOW AND WIND LOAD.

The overturning moment due to the action of wind pressure on the inflated gasholder is resisted by the interaction between the spiral guide rails on the floating lifts and the roller carriages which are attached to the tank balcony. In practice, the carriages are usually constructed with a small clearance between the roller treads and the guide rails, to allow for unequal expansion of the side sheeting and slight inequalities in construction. The roller axles are also arranged in the carriage bearings with small clearances which permit of any slight radial movement of the holder that may be necessary. These clearances, however, do not affect the stresses in a general manner, so far as the following mathematical investigation is concerned. The action of the wind load on the floating portion of the structure not only produces an overturning moment, but also shearing forces which reach their maximum value in the plane of the tank balcony. In addition to this load, however, there is the local influence of the wind pressure and suction to be considered. The proportional depths of the lifts and tank side over which the local wind load (P_1) operates is shown in fig. 7.

The influence of the wind on the top curb or bottom curb or tank balcony is usually taken as acting over half the depth of the lift $\left(\frac{d}{2}\right)$. The local wind influence on the cup and dip rings is taken as acting over a depth equal to one lift (d).

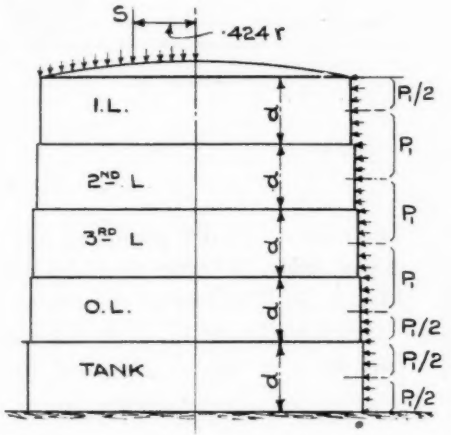


Fig. 7.

The shearing force of the wind on an inflated lift of the gasholder is held in equilibrium by a system of counter forces in the cup and dip and tank balcony rings. The magnitude and direction of these forces may be deduced from the following considerations. Suppose two stiff rings are so arranged that one is some distance above the other and is connected thereto by means of a thin elastically stiff cylindrical lamina so as to form an annulus similar to that represented by the curb or cup rings and side sheeting of a gasholder. Then if a force P_1 be applied to the upper ring while the lower ring is rigidly held in position, stresses are induced in the sides of the annulus tending to restrain the displacement of the upper ring. As the material connecting the two rings is relatively very thin, it is incapable of resisting any radial stress. The thin annulus can therefore only effectively resist stresses in a direction tangential to the curvature. Fig. 8 indicates in plan the upper and lower rings A C B. The upper ring under the action of the force P_1 moves to the position A^1 C^1 B^1 shown dotted.

Now at any point O on the rings, the lateral displacement will be $OO^1 = \delta_1 =$ a constant for all points. This displacement may be resolved into its radial and tangential components OO^{11} and $O^{11}O^1$ respectively. No stress, however, is induced in the annulus by the radial displacement OO^{11} but the tangential displacement $O^{11}O^1$ induces stresses, since the movement is in the direction of the material forming the annulus. It will be observed that the magnitude of the stresses at any point O will be proportional to the angle subtended (α, γ, &c.), and the magnitude of the load P_1. If the ring be divided into a number of equal parts, the total stress in each section may be indicated by a system of force vectors similar to O^1O^{11}. In actual practice, the curb and cup rings are held in position by a system of stresses set up in the vertical stays, guide rails, and the side sheeting of the holder. These stresses vary in magnitude at each point round the periphery of the holder in the manner described above. In calculating these forces it will be found most convenient to assume that the curb and cup rings are held in position at points equal in number to the guides on the lift, or some convenient submultiple of these. This assumption will not incur any appreciable error and will enable the investigation of the various stresses in the structure to be identified more easily.

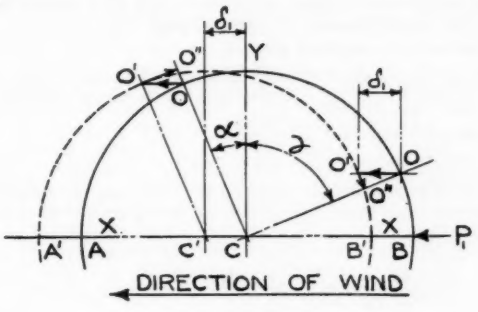


Fig. 8.

Under the action of the shearing and resisting forces, the top curb, cup, and balcony rings tend to distort from their original circular shape. In the case of the top curb deformation is prevented to a great extent by the restraining action of the crown sheeting. In the case of the cup rings some deformation does occur, but this is limited by the action of the internal gas pressure which tends to preserve the circular shape of the structure. As the cup and dip rings are of small width in comparison to the diameter of the holder, it may be shown that under ordinary conditions of wind loading the actual deformation or deflection of the rings is not sufficient to allow of any appreciable bending moment developing.

While it is permissible for a certain amount of deflection to take place in the cup and dip rings, it is not desirable to allow the tank balcony ring to deform to anything like the same extent, as it is in the plane of the tank balcony that all the movement of the holder takes place. Any appreciable amount of distortion at this point may seriously affect the satisfactory working of the structure, and the design of the tank balcony should therefore be of sufficient strength and stiffness to resist undue deflection.

The radial components of the local wind force w, w_1, w_2, w_3, &c., acting on any ring of the inflated lifts may be readily determined by reference to fig. 5. The amount of load at each point is then

$$w, w_1, w_2, \text{\&c.} = ABV\rho d \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (10)$$

where A = the coefficient of the wind load in the vicinity of each point on the ring (see fig. 5),
B = the distance between the points,
V = the proportional depth of the holder lift over which the influence of the local wind load is acting.

The system of forces w, w_1, w_2, &c., and the resisting system of tangential forces x, ax, bx, &c., operating on any ring, will be indicated by the nomenclature $[w]$ and $[x]$ respectively.

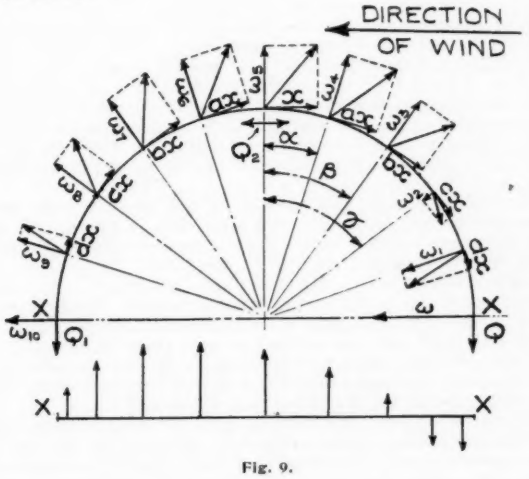


Fig. 9.

Fig. 9 illustrates diagrammatically the sense and magnitude of the wind and horizontal resisting force systems $[w]$ and $[x]$ for a gasholder having 20 sub-multiples of guide rails on the lift. The following investigation is,

however, applicable to any number of guides. As the force systems are symmetrical about the axis XX only half the ring is shown.

It will be seen that the tangential resisting forces at equidistant points on any particular ring are proportional to the cosines of the angles subtending them from the axis YY. Then since the resolved components of these forces in contradirection to the wind must be equal and opposite to the total value of the local wind load (P_1) acting on the ring, the equation may be represented thus:

$$P_1 = 2x + 4ax\cos\alpha + 4bx\cos\beta + \ldots \quad (11)$$

where a, b, c, &c. = proportionate fractions dependent upon the subtending angles α β, γ, &c.

This may be reduced to

$$P_1 = 4x\,(0{\cdot}5 + \cos^2\alpha + \cos^2\beta + \cos^2\gamma + \ldots)$$

and by equating for the maximum value x, and expressing this series in tangent form, the following is obtained:

$$x = \frac{2P_1}{n} \quad \ldots \quad (12)$$

where n = the number of points round the circumference of the ring,
P_1 = the local shearing load of the wind on the ring.

The values of ax, bx, &c., may then be found from the expressions $x\cos\alpha$, $x\cos\beta$, &c., respectively.

If the rectangular components of the two systems of forces $[w]$ and $[x]$ be drawn at each point round the circumference of the holder as indicated in fig. 9, it will be seen that the cup and dip rings are subject to tensile stress which reaches a maximum value on the leeward side of the holder on the XX axis. The magnitude of the stresses may be calculated from the principle of moments. In fig. 9 is shown the resolution of the force systems $[w]$ and $[x]$ acting on the cup and dip into directions perpendicular to the axis XX. The tensional reactions Q and Q_1 in these rings for the windward and leeward sides of the holder, respectively, may then be shown to bear the following relationship to the local wind load:

$$Q = {\cdot}2P_1 \quad \ldots \quad (13)$$

$$\text{and } Q_1 = {\cdot}54P_1 \quad \ldots \quad (14)$$

If the force systems $[w]$ and $[x]$ are resolved normally to the axis YY it will be found that the resulting tensional reaction Q_2 on this axis is nearly equal to Q so that

$$Q_2 = Q = {\cdot}2P_1.$$

The cup and dip ring as understood with reference to these calculations constitute the cup and dip plates, the skirting plates, channel sections, and the adjoining row of side sheeting extending over a depth in all of about 3 to 3·5 times the depth of the cup.

Therefore the tensional stress in the cup and dip rings may be expressed as follows:

$$f_3 = \frac{Q}{A_1} = \frac{Q_2}{A_1} = \frac{{\cdot}2P_1}{A_1} \quad \ldots \quad (15)$$

$$f_4 = \frac{Q_1}{A_1} = \frac{{\cdot}54P_1}{A_1} \quad \ldots \quad (16)$$

where f_3 = the tensile stress in the cup and dip rings on the windward side of the holder (on axis XX), and also on both sides of the axis YY,
f_4 = the tensile stress in the cup and dip rings on the leeward side of the holder (on axis XX),
A_1 = the equivalent area of the section of the cup and dip ring after considering joint efficiency.

(To be continued.)

: WATER GAS FROM : DRY-QUENCHED COKE

The economy of dry-quenched coke in the manufacture of water gas is dealt with by Mr. A. B. Wolle in a recent issue of the "Gas Age-Record." A 6 p.ct. saving in fuel is, it is stated, obtained by using dry coke

When coke is wet quenched, water vapour is drawn into the heart of the coke pieces and is removed only with great difficulty by drying; hence, dry-quenched coke with a similar moisture content will have the moisture in a surface form which is easily disposed of and serves to reduce the temperature of the exit gases, having little or no effect upon the fuel bed. In using wet-quenched coke the penetration of the heat to the heart of the coke pieces is retarded through the evolution of the included moisture requiring heat generated by the piece itself and a longer blast period. This condition would be expected to continue until the piece had gone well down into the fuel bed and so affect the fuel bed temperature.

Coke produced in continuous vertical ovens gives results different from intermittent oven coke. The theory that the difference in coke structure was the cause has been exploded, as it has been definitely proved that the difference in coke structure bears no relation to the results obtained in water gas manufacture. The principal difference between the two cokes is in the method of quenching and consequently the location of the moisture in the coke pieces.

Extremely careful wet quenching will produce coke with a moisture content as low as 2 p.ct. On an average it will run between 5 and 6 p.ct. This is considered good operation for bye-product coke oven practice. Very often the moisture in the coke will run as high as 10 p.ct. and sometimes reach 25 p.ct. in the smaller sizes. Nevertheless, it is evident that in any case included moisture must be removed from the coke before it can enter in an efficient reaction. This moisture removal may be considered a mechanical function, but its removal requires heat that has been generated by a portion of the fuel.

It would appear, therefore, that if moisture-free coke were used in water gas machines, a saving in the fuel would be expected, and that the blast cycle could be shortened since no portion of this cycle would be required for the purpose of evaporation. The amount of fuel saved on a calculated basis would be approximately equal to 1 p.ct. of the fuel for each 1 p.ct. reduction in moisture content. This value may be assumed as within the limits of error, since it is relatively difficult to secure an accurate knowledge of the moisture present in the coke, regardless of the care in sampling, and the error may lie as much on one side of the actual values as the other.

Based upon the foregoing assumption that elimination of water could be expected to produce better operating results, a careful test was carried on at the Rochester Gas and Electric Company over a ten-day period wherein it was actually found that a 6 p.ct. saving in fuel could be obtained by using dry-quenched coke. During this time the water gas make was practically constant and every variable was eliminated except the fuel.

Two other significant features were noted during these tests—first, that the dry coke, having little or no surface moisture, carried with it practically no coke dust. Generally speaking this coke dust carried with the larger pieces is a nuisance. It is carried out of the generator and deposited in the carburettor, the superheater, boiler, and wash box, and from each of these it must be removed at the cost of time and labour. The use of bone-dry fuel does not eliminate dusting, but it does reduce it to a minimum, since the dust formed is due only to handling as the coke enters the set.

Excess fines remaining in the fuel settle into pockets formed by the voids in the coke mass and cause channelling of the fires—a highly unsatisfactory condition. It is common knowledge that unless care is exercised to overcome it the blast gases have a tendency to pass to the walls of the generator where the larger pieces of coke have collected. This condition can be seriously aggravated through the collection of the coke fines in the centre of the bed in the regions of lower gas velocities. To overcome this condition several plants have felt justified in installing screens between the feed hoppers and the generators to remove all fines below a ⅜-in. size.

The second feature determined by the tests was that with moisture-free coke the average size of the fuel could be reduced—that is, a smaller fuel could be used with the same results. Just what these limits are has not been definitely determined at this time. The indications are favourable, however, to a ¾-in. breeze screen.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany.

TECHNICAL AND ECONOMIC PRINCIPLES OF COKE OVEN HEATING.

"Glückauf," 1932, 68, 1-8 (Jan. 2) and 40-45 (Jan. 9), contains a paper read by K. Baum before the Coke Oven Section of the Fourth Conference of the Rhenish Westphalian Mining Association in Essen last October. It discusses very comprehensively, with the help of numerous charts, the principles involved in the heating of coke ovens.

The heat consumed in the coking operation and the yields of bye-products depend very largely on the skill of the designer. Great weight must be attached to the fuel consumption, since the cost of this is almost as great as the capital charges and is several times as great as that of salaries and wages.

The fuel economy problem involves two different aspects:

(1) The amount of fuel used in excess of that theoretically necessary.
(2) The recovery of the sensible heat of the carbonization products.

The coking heat may be defined as the amount of heat in B.Th.U. (net basis) which must theoretically be used to convert 1 lb. of wet coal at 15° C. into coke at a specified final temperature, 900° C. Since this temperature cannot simultaneously prevail throughout the coke mass, a *mean* final temperature of 950° C. is generally counted upon. The average net coking heat of the coals treated in a great proportion of the Ruhr batteries is 675 B.Th.U. per lb. of wet coal containing 11·5 p.ct. of moisture. On the assumption that 1 lb. of dry coal yields 2313 B.Th.U. of gas (net basis), one-third of the gas made would be required for underfiring if the underfiring efficiency were 100 p.ct. If the underfiring efficiency were only 33 p.ct., the whole of the gas made would be required. For waste heat ovens, for which the maximum efficiency which can be counted upon is 39 p.ct., only 15 p.ct. of the gas made would be available as surplus gas. With an efficiency of 70 p.ct., which is the normal figure in modern regenerative settings, more than 50 p.ct. of the gas made is available as surplus gas. The average net heat consumption in modern batteries in the Ruhr is 945 B.Th.U. per lb. of coal containing 11·5 p.ct. of moisture.

The theoretical effect of variation in the carbonizing temperature and in the moisture content of the coal on the heat requirements is shown graphically, and consideration is given, also, to firing with producer gas generated at different efficiencies. The following data are given for modern batteries in the Ruhr:

Construction.	Width. Ins.	Gross Carbonizing Time. Hrs.	Coal Charge/ Oven. Tons.	Moisture Content. P.Ct.	Final Temperature of Coke. °C.	B.Th.U./ Lb. of Wet Coal.	Underfiring Efficiency. P.Ct.	Coking Heat. B.Th.U./ Lb. of Wet Coal.	Working Temperature. °C.	Waste Gas Data.			Losses by Radiation and Conduction.		
										Temperature. °C.	Air Used × Theoretical.	Loss. P.Ct.	Surface. Sq.Ft./ Ton.	Loss. B.Th.U./ Sq. Ft./ Hr.	Loss. P.Ct.
Otto	18	21·8	20·84	9·3	..	898	68·3	614	1230	355	1·49	20·1	27·4	382·3	11·6
Koppers	16	16·8	16·62	14·1	930	992	75·2	747	1255	353	1·24	16·6	30·3	356·4	8·2
Koppers	18	20·0	18·11	11·4	970	983	69·9	688	1300	437	1·27	20·0	28·5	393·3	10·1
Otto	14	12·0	8·01	11·4	960	956	68·5	655	1310	431	1·20	19·1	53·5	415·6	12·4
Koppers*	18	18·0	12·36	11·8	930	907	74·2	673	1340	302	1·04	16·3	37·5	286·6	9·5
Otto	19	20·0	11·21	11·7	900	923	67·5	625	1240	364	1·47	24·3	35·0	244·0	8·2
Otto	16	14·6	11·06	11·6	985	932	69·9	652	1290	382	1·49	21·0	35·1	369·7	9·1
Still	18	22·0	28·14	12·1	970	927	78·0	724	1285	415 (350)	1·19	15·5	24·4	249·2	6·5
Collin	18	19·8	20·20	10·3	970	920	73·8	679	1295	398	1·33	18·8	27·9	275·0	7·4
Koppers	20	17·45	18·50	10·3	1030	974	74·9	724	1450	370	1·23	16·9	29·3	353·8	8·8
Koppers	20	22·0	18·50	9·8	950	898	74·0	664	1300	326	1·16	14·3	29·3	335·4	11·7
Koppers	20	33·4	18·50	11·5	850	846	74·2	628	1020	296	1·20	13·5	29·3	239·6	12·4
Otto	18	11·8	12·30	7·9	1060	983	74·8	736	1500	408	1·12	17·9	34·4	392·6	7·3
Otto*	18	11·8	12·30	7·9	1055	1055	70·3	742	1500	369	1·28	22·8	34·4	398·1	6·9

* Producer gas firing. The remainder are fired with coke-oven gas.

The data for the 20-in. Koppers ovens relate to one battery and show the effect of altering the operating conditions. The regenerators were designed on a liberal scale; hence the underfiring efficiency is independent of the flue temperature and throughput, but the heat consumption per lb. of coal decreases as the carbonizing temperature is decreased. The heat consumption per lb. of coal is thus not a criterion of the performance of a battery, since it varies with the operating conditions. The data in the last two lines are for a compound battery and give the results obtained respectively with gas of high and low calorific value as fuel. The underfiring efficiency is lower in the latter case, since natural draught was employed and the waste gas loss was higher due to the greater amount of excess air used. The small excess of air in the case of the Koppers battery working on producer gas is not good practice, since this must mean that insufficient air was employed in some of the burners, otherwise the average air figure must inevitably have been higher.

From the table it is evident that the major portion of the heat lost is in the sensible heat of the gases leaving the setting. These losses are very much less than in the case of waste heat batteries, since, in regenerative settings, the working temperature has been increased due to the preheat which is given to the air, and the carbonizing time is reduced. The importance of avoiding too much excess air is evident.

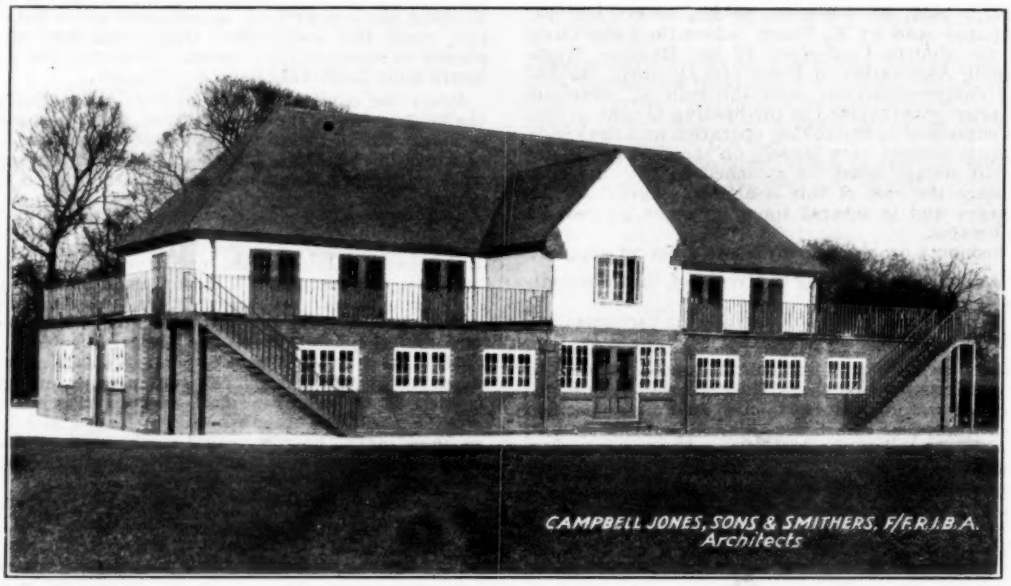
Emphasis is laid on the need for adequate regenerator capacity in order that a maximum degree of preheating may be achieved and the waste gas losses minimized. The radiation losses are reduced in ovens of large capacity in virtue of the reduction in the radiating surface per ton of coal—*e.g.*, from 53·5 sq. ft. per ton in an oven of 8 tons capacity to 24·4 sq. ft. per ton in an oven of 28·1 tons capacity. Hence, in a small, wide oven in which foundry coke is made, the same small heat loss cannot be expected as in a large, narrow, rapid oven making blast furnace coke. The total heat consumption per lb. of coal carbonized decreases with decrease in the width of the oven and with increase in the cubical capacity of the oven.

Even though the underfiring efficiency is high in modern settings, there still remains the possibility of recovering heat from the coke and from the coal gas. From the coke, heat may be recovered (1) by dry quenching in inert gases, whereby 0·4 ton of steam may be obtained per ton of coke with an efficiency of 70-75 p.ct. (Collin, K.S.G., or Sulzer process); (2) by quenching with producer gas, whereby the latter is preheated and at the same time its calorific value is increased due to reduction of carbon dioxide to carbon monoxide (Collin system); or (3) by dry quenching with steam, whereby water gas is produced (Heller-Bamag or Pintsch-Otto system). The latter is only in the development stage. Part of the sensible heat may be recovered from the carbonization gases (1) by generating steam therefrom—0·1 ton per ton of coke produced (Collin system)—(2) in working the refrigerating machine of the Lenze intensive gas cooling system, or (3) by utilizing the gases for the direct distillation of tar (Semet-Solvay system).

The heat consumption per lb. of coal carbonized is not a decisive criterion of the performance of a battery, since it depends on so many factors. Better criteria, which may, also, form the subject of guarantees, are the underfiring efficiency, the heat loss by radiation per square foot of battery surface per hour for a specified working temperature, and the degree of uniformity of carbonization throughout the charge. As regards the heat economy of coke ovens, there is now little room for improvement. There is, however, scope for a more systematic investigation of the coals handled, with the object of securing the best treatment from the point of view of coke quality—*i.e.*, a proper selection of operating temperature, speed of carbonization, and width of oven.

HOT WATER EQUIPMENT FOR A SPORTS PAVILION

The plant described is by Thomas Potterton (Heating Engineers), Ltd., and was specially designed for a new Pavilion of the North-Western Polytechnic erected at Stanmore, Middlesex



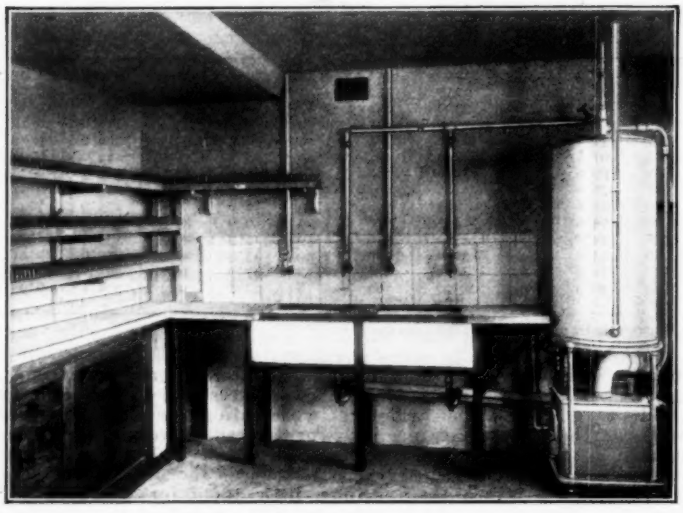
NEW PAVILION FOR SPORTS GROUND OF THE NORTH WESTERN POLYTECHNIC AT STANMORE, MIDDLESEX.

This sports ground comprises 15 acres, of which about half is now developed. The exterior view shows the front elevation of the pavilion, which is a two storey building approaching 100 ft. in length by 40 ft. wide, at the rear of which is an annexe which accommodates the lavatories and the heating plant. On the ground floor of the pavilion ample accommodation of dressing rooms is provided. The men are provided with a series of four showers, a large pool, and a range of eight lavatory basins, while on the ladies' side eight lavatory basins and four showers are available.

The boiler plant consists of two separate main units, one for use with the plunge, the second battery serving the showers and handbasins.

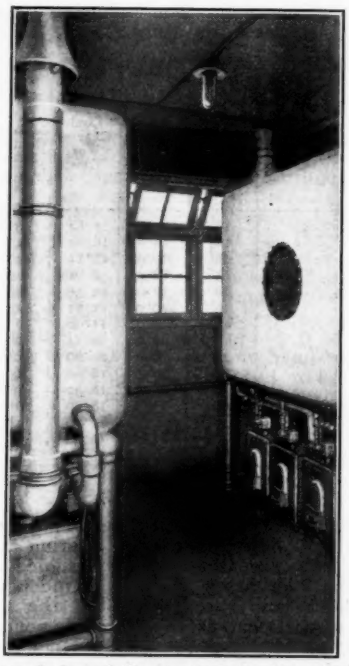
The pool has a capacity of 650 gallons when filled to its normal depth, and is provided with plant comprising a battery of four "Empire" automatic water heaters in conjunction with a specially constructed storage vessel of rectangular shape containing 350 gallons. This is heated to its maximum temperature of 80° Fahr. above normal cold water in 2 hours 15 min. during the progress of the play.

A special arrangement of services is employed in this case, the apparatus being provided with a filling cup slightly above the level of the tank, over which a supply branch from the rising main is carried, an overflow from



A CORNER OF THE KITCHEN,

Showing "Empire" Lagged Set for Thermal Storage Supply in Culinary Work.



A general view of the Heating Chamber, showing the Lagged Storages for general Hot Water Supply to Showers and Hand Basins (left) and to the Pool Bath (right); each having a battery of four "Empire" Water Heaters.

the vent indicating when the apparatus is filled. For the purpose of filling the bath a 2-in. supply is taken from the underside of the tank, which stands slightly above the roll of the pool and works upon the run-back process.

Upon the termination of the games the groundsman has about 6 in. of cold water standing in the bath, when he is enabled to turn on both taps and fill it up very rapidly, thus limiting the amount of time taken in drawing off, thereby avoiding waste of heat otherwise involved by standing.

For the supply to lavatory basins and shower baths a standard form of apparatus is provided, fed from a cistern in the roof by a 2-in. down service delivering water to the fittings through a secondary circulation taken at ceiling line on the ground floor above the lavatory basins and showers, in order to avoid an undesirable quantity of cold water being delivered before the hot reaches the taps. The boiler plant consists of four No. 2 "Empire" water heaters with 300 gallons storage.

The shower supplies are controlled as regards temperature by adjustable blenders which have dial indicators to prevent scalding.

In the design of the plant provision is made to enable one boiler unit to work on a reduced supply of 100 gallons for lavatory basin purposes only when sports are not in progress, as for evenings when entertainments are being staged. This is effected by connecting one of the "Empire" water heaters upon a direct circuit with the cut-out valve shut, while at other times the same unit operates for the full storage by the reverse setting of the valve.

Special provision has been made in this installation to avoid waste of heat by radiation, the whole of the storage and secondary circulation being lagged with special composition of asbestos having an intermediate layer of magnesia, thus maintaining a high efficiency with economy.

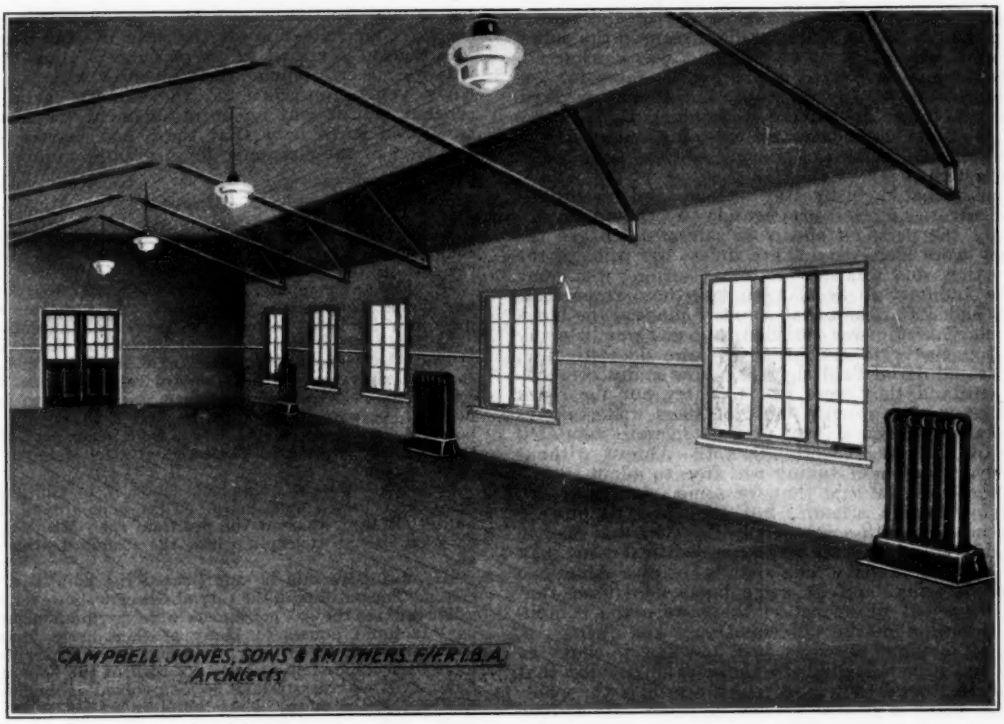
The heating chamber is well ventilated, there being windows on each side and also air bricks. Non-corrosive flue connections are made to the boilers with "Urastone" pipes, properly equipped with internal baffles and having G.L.C. terminals above the roof of the outbuilding, which is a single storey.

The foregoing deals exclusively with the gas-heated hot water supplies for the bath and lavatories, there being entirely separate equipment for culinary and social requirements which the pavilion provides on the upper floor.

The accommodation provides a large room for dances and other social events, and this, with the necessary kitchen and buffet at the end, occupies the full area of the site.

The large dance room is heated by a series of gas radiators, while at the end of it is a buffet with a Jackson heater for supplying boiling water for tea-making, while in the kitchen an "Empire" thermal storage lagged set is available for the culinary requirements.

The builders were Messrs. Wm. Shurmur & Sons, Ltd., Upper Clapton, E. 5.



THE LARGE DANCE ROOM, SHOWING THE SERIES OF JOHN WRIGHT & CO.'S "ST. DAVID" GAS-HEATED RADIATORS.

NOTES ON PLANT AND PROCESSES

A Coming of Age Record.

Last year marked the 21st anniversary of the Kleenoff Company under the proprietorship of Messrs. Bale & Church, Ltd., and the occasion was to be celebrated by a very special sales campaign with the object of improving on all previous records. This was no mean ambition, in view of the fact that each successive year of the Company's existence had shown an increase over its predecessor. In spite, however, of the acute general trade depression, the ambition was realized, and their many friends will join in congratulating them on the fact that the 1931 increase was the largest on record. The Company, for their part, attribute the success in no small measure to the enthusiastic support of the Sales Departments of gas undertakings throughout the country.

The Company's special effort was on the production side as well as in sales organization, and advertising was a feature of the year. The care and attention which were given to photography, with a view to the production of really high-class illustrations, were rewarded in the familiarity of the public with Kleenoff announcements in the national Press and magazines, which admirably achieve their object in conveying a one-glance recognition of the uses of the product with a minimum of printed matter. The Kleenoff Company acknowledge the courtesy of the Richmonds Gas Stove Company, Ltd., in lending a Bungalow cooker for the productions.

British Commercial Gas Association

Annual Meeting of Members in Scotland

At the Annual Meeting of the members in Scotland of the British Commercial Gas Association, which was held in the Central Station Hotel, Glasgow, on Friday afternoon, an interesting discussion was initiated by Mr. J. W. McLusky, Gas Engineer, Glasgow. The subject dealt with had reference to the comparison of the old and new methods of charging for ordinary gas supply by the Glasgow Corporation Gas Department.

Councillor Catto, Aberdeen, was in the chair, and was supported by Sir Francis Goodenough, Chairman of the B.C.G.A., and Mr. J. W. Napier, Alloa.

Methods of Charge.

In the course of discussion on the future policy and programme of the B.C.G.A., Mr. Napier said he was satisfied the Gas Industry would not gain in importance or progress in the manner it so well deserved unless a new system of charging was made for gas consumers. He was convinced of that because of the data he had before him regarding certain gas undertakings in Scotland. He had before him the case of an undertaking with an output of 50 millions where there was a proposal to reduce the price of gas, which was 5s. per 1000 c.ft., by 2½d. per 1000 c.ft. Obviously that deduction was not going to be an encouraging one for the consumers, and the effect of it would in due course have been reflected in the results of the undertaking. In the case of the undertaking instanced the policy of adopting a block system of charging was considered, and a scheme was agreed to approving of rates for gas ranging from 5s. to 3s. 4d. The outcome of that arrangement was that large consumers were going to be benefited—not the industrial consumers only, but domestic consumers as well. All classes of consumers were included in this block system.

They could not hope by any strong and intensified schemes of advertising and propaganda, by showroom displays, or by the personal efforts of salesmen, to get the success they were likely to achieve unless the price of the commodity they sold was satisfactory. Nothing was going to help the Industry in Scotland unless those responsible for the gas undertakings in that country adapted the block system of charge. He was satisfied that gas was in many instances too costly to encourage a large domestic use, while in the industrial field they had now many competitors. In Scotland they were free to carry out the block system of charging, because most of their undertakings were non-statutory, and a large proportion were regulated under the Burghs Gas (Scotland) Act. Almost without exception every gas undertaking was free to adopt it.

Mr. J. W. McLusky said that for some years they had been thinking over a scheme, but they had to proceed delicately, because with some people the step they had in contemplation was likely to become a political issue. In the year 1925 he made a close study of the American method of charging, and he came home convinced that the ideas they had in operation there were too complicated for adoption in the old country. That being so, he had to set out and discover just how far he could go politically and economically. In the end he decided that the only satisfactory way was to take a census of the whole city from the point of view of gas consumption. He arrived arbitrarily at the quantity of consumption entitled to the standard charge.

It would be found from the tabular statement of comparative costs that he had drawn up, that by the card index the occupier of a single apartment house was found entitled to take 3000 c.ft. per quarter. The entire city, as they would see from the statement, was divided up into six classes.

The statement referred to, proceeded Mr. McLusky, was most interesting, and required to be carefully studied in order to understand how the system of charging worked. For instance, it would be seen how the consumer in the one apartment house, by using gas for heating and cooking, effected a saving of 1s. 4d., and to many of the poorer type of consumers in the City of Glasgow at the present time a saving of even 1s. 4d. on gas was an important thing. It was, after all, an equitable arrangement, and meant as much to the poor consumer as the saving of £15 11s. 10d. did to the owner of the great mansion at the head of the tabular list. Some of those present might be under the impression that there was a "snag" somewhere, but he could tell them that in Glasgow they had not discovered the snag yet. The new system of charging was confirmed by the Corporation of Glasgow on Sept. 3, 1931, and the table of rates for gas supply became operative afterwards from the commencement of the first reading

Glasgow Corporation Gas Department.

Comparison of Charges.

Old and New Methods—Ordinary Supply.

Class.	Consumption. C.Ft.	Charge, Old Method at 3s. 6d. per 1000 C.Ft.	Charge, New Method.	Benefit.
		£ s. d.	£ s. d.	£ s. d.
06	519,800	55 15 4	40 7 6	15 11 10
06	17,200	3 0 3	2 11 0	0 9 3
06	31,500	5 10 3	4 6 9	1 3 6
6	43,000	7 10 6	5 15 6	1 15 0
6	36,000	6 6 0	4 18 0	1 8 0
5	24,800	4 6 10	3 10 0	0 16 10
5	23,000	4 0 6	3 5 6	0 15 0
4	14,200	2 9 9	2 1 6	0 8 3
4	17,500	3 1 3	2 9 9	0 11 6
3	13,200	2 6 3	1 18 0	0 8 3
3	11,600	2 0 8	1 14 0	0 6 8
2	7,400	1 5 11	1 2 6	0 3 5
2	9,000	1 11 6	1 6 6	0 5 0
1	4,300	0 15 1	0 13 9	0 1 4
1	3,900	0 13 6	0 12 9	0 0 11

meter cycle in the case of ordinary meters, and from the second coin collection in the case of coin meters. The information revealed in the tabular statement submitted was the ascertainment after the first survey. It was too early yet to postulate on the success or failure of the scheme, but it was an encouragement to those who had sponsored it to hear that there had been a demand on the part of the consumer for a greater number of gas appliances.

Discussion.

Mr. H. H. Gracie, Edinburgh, wondered if Mr. McLusky could state how much the consumption had benefited the revenue of the Department.

Mr. McLusky replied that it was rather early yet to offer any definite opinion on that point. As a matter of fact they were only half-way through the survey of the entire city.

In reply to some additional questions from Mr. Samuel Milne, Aberdeen, Mr. McLusky explained that in Glasgow they could possibly reduce the standard rate below 3s. 6d. per 1000 c.ft. Such a reduction, however, would not to his mind be justified, because it would be too low a charge for the average body of consumers in the city. In a scheme of this kind the "backbone" charge had to be fixed after weighty and mature consideration.

Mr. John Wilson, Dundee, asked if in Glasgow they had fixed the "backbone" charge on the floor area of the dwelling-house. If that was not the position, then Mr. McLusky might be good enough to explain how the standard price was arrived at.

Mr. McLusky said he appreciated the point Mr. Wilson had raised. The position in the City of Glasgow, however, was that the great bulk of the gas consumers were occupiers of houses known as "factored houses." Many of them were factored houses with one, two, three, four, five, and six apartments. It would have been impossible to take a record of the floor area of these houses. That task would have involved labour for a matter of five years or more. They therefore set about fixing a "standard" consumption for ordinary meters on the following basis: One room, 3000 c.ft.; two rooms, 4000 c.ft.; three, 5000; four, 6000; five, 8000; six, 8000; and over six, 8000. Gas up to the standard consumption was sold at 3s. 6d. per 1000 c.ft., and the quantity of consumption in excess of the "standard" was sold at 2s. 6d. per 1000 c.ft. The relative figures for prepayment meters were: One room, 2000 c.ft., regarded as standard consumption per coin collection; two rooms, 2700; three, 3500; four and over four, 4000 c.ft. The basis charge in respect of prepayment meters was 3s. 11d. per 1000 c.ft. up to the standard consumption per coin collection, while the quantity consumed in excess of the standard was given at 2s. 11d. per 1000 c.ft.

Mr. J. Richmond, Penicuik, said he took the view that the Gas Engineer of the City of Glasgow was to be congratulated on the bold move he had taken.

Sir Francis Goodenough remarked that the scheme which had been unfolded to them by Mr. McLusky was a most interesting one, and he believed it was possible for the Industry to benefit a great deal from it. They could sell gas at 4s. per 1000 c.ft. with good salesmanship, and with good salesmanship they could have infinitely better results if they were selling gas at 3s. per 1000 c.ft. Price, they were all bound to acknowledge, was an important factor in salesmanship. It did seem to him that there were immense possibilities in the scheme Mr. McLusky had formulated, if it was loyally backed up by good salesmanship.

The meeting thanked Mr. McLusky for the information he had so readily placed at the disposal of the Scottish members of the B.C.G.A.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Australian Gas Institute

PRESIDENTIAL ADDRESS

of A. E. BRADSHAW, Secretary of the Metropolitan Gas Company, Melbourne.

[Extract.]

For details of the progress of the Gas Industry in Australia I am indebted to the brochure issued by the Research and Investigation Department of the Australian Gas Light Company. This discloses that 73 gas undertakings in Australia sold, during 1930, nearly 17,000 million c.ft. of gas to 738,539 consumers.

Unfortunately, owing to the Department having been only recently established, the statistics over a period of years with reference to all undertakings are not complete; but a comparison is available of the gas manufactured by 50 undertakings during 1921-30. In that period the quantity manufactured rose from 14,644 millions in 1921 to 19,080 millions in 1930—an increase of 30 p.ct. The increase was steadily maintained up to the year 1929, but 1930 showed a 6 p.ct. decrease on the previous year.

I would like to record here my appreciation of the valuable statistics being compiled by the Research Department of the Australian Gas Light Company. This will become more and more useful as progress comparisons are available.

SALESMANSHIP AND BUSINESS MAINTENANCE.

I wish to impress on you the necessity of keeping the Gas Industry in the front ranks of progress in the direction of cooking and heating apparatus and appliances for industrial use. The field is open to all competitors, and if apparatus for burning gas is allowed to get out of date and inefficient, loss of business will surely result.

Have you ever considered what a bad advertisement an inefficient gas stove is? It displeases the housewife, and she talks about it to her neighbours and so commences an adverse propaganda. This holds good with regard to all inefficient gas appliances, and whether their inefficiency is due to defective apparatus or ignorant use the effect will be to retard sales to others.

A good appliance, efficiently used, is as good as a good salesman; it advertises itself. Therefore we must keep gas appliances in an efficient condition so far as is possible, and demonstrate their proper use.

If only we could impress on all sections of those employed in the Industry the absolute necessity of keeping the interests of the Industry in the forefront and of seizing every opportunity of pushing the gas business, we should, I am sure, be able to more than hold our own against competition.

I believe that a more determined effort should have been made to retain street and private gas lighting. Although it is admitted that gas lighting has not the convenience of electric lighting, no one can deny that gaslight is superior as a means of illumination. In addition to this it was a very useful front line, and we have allowed it to be taken and are now driven back to the second line—domestic heating and cooking and industrial gas. This line is being seriously threatened by both electric and oil competition, and it is only by determined and co-operative efforts that they can be ousted from the position or prevented from gaining any further territory.

I note that in England gas undertakings are still putting up a determined fight to retain street lighting, and even upsetting electric competition by activities in this direction. I think we should assume the offensive by returning to this line rather than be driven to the defensive all the time.

NEW BUSINESS FROM PRESENT CONSUMERS.

In these days of curtailment in main-laying the principal avenue presenting itself for the extension of gas business lies in the adoption of additional appliances by those resident on the lines of our existing mains.

The practical services in attention to consumers' appliances and the Home Service Branch in promoting a greater knowledge of their use are mutually advantageous to the company and the consumer, and, while fully appreciating the good work of this section, I feel that we do not fully comprehend the valuable potentialities of the staff engaged as a medium for new business. I would strongly advocate that gas companies explore the possibilities in this direction if they have not already done so.

Canvassers may be sent from door to door, but unless they are gifted with the most persuasive eloquence they will seldom get a patient hearing. The officer already in the home on other business has the golden opportunity for discovering the prospect. I am not unmindful of the fact that the officer's first consideration must be his primary duty, but I feel you will all agree that opportunities do arise and that we must see that the knowledge and facilities necessary to ensure the maximum results are provided.

Another valuable factor possessing new business possibilities is the cookery demonstration. The popularity of these demonstrations was most convincingly proved recently here in Melbourne where, in a series of two demonstrations each in the suburbs of Caulfield, Essendon, and Prahran, the total attendance was 3200; the average being over 530 and the maximum 720. To secure personal conversation with such a number would almost have been impossible with canvassers, and yet these huge audiences spent fully an hour at the close of each demonstration inspecting appliances displayed.

A gas undertaking's organization embodies a regular and continuous contact with customers by its outdoor staff. Business connection largely exists through them, and this valuable asset can only be used by operating through those who possess it. Let the purpose be to engender among all employees, whose duties take them to the homes of consumers, a spirit of common endeavour with one aim in view—the Advancement of Gas.

TRAINING OF SALESMEN.

The manufacturers of gas appliances are busily engaged in laboratory and practical tests for improving apparatus, and there is no doubt that the gas cooking and heating appliances at present on the market have reached a high stage of efficiency. It is not enough, however, merely to place these on the market; they have to be introduced to prospective consumers, and it is here that salesmanship of first quality is required. It is a salesman's duty to educate the public in the many advantageous uses to which gas can be put.

In order to fit men for the position of salesmen to-day I believe that a course of training should be insisted upon; in fact, it is becoming imperative to train salesmen in this way.

It is certain that efficient salesmanship is the principal weapon in our armament to withstand the encroachments of our adversaries in the fight to heat the homes, cook the food, and supply the many industrial needs of the public. Therefore, to prepare salesmen, they should undergo a course of training in workshop, laboratory, and showroom to make them thoroughly conversant with the effective working of all models of the gas appliances which are on the market.

SALES OF RESIDUAL PRODUCTS.

The sales of residual products, which for many years afforded such a splendid source of revenue income to gas undertakings, have recently shown a serious reversal. This is almost wholly due to intensive competition from other products. Coke, which was in heavy demand as a fuel for

industrial plants, and in a lesser degree for household purposes, has lost considerable ground in this State by reason of the greatly reduced prices of New South Wales and Victorian coals, and, in addition, brown coal briquettes, produced and sold by the Victorian Electricity Commission, are being offered at very low rates. Fuel oil is also a strong competitor.

The installation of a water gas plant in Melbourne has enabled a control of coke supplies and assisted in stabilizing the market for this fuel by absorbing surplus production. It is obvious, however, that attention will have to be given to the quality and grading of coke as a fuel if the increasing competition is to be met. The briquette competition is serious in that the fuel market is being secured at prices which can leave no margin above working expenses and freight, and, in fact, in many cases must show a loss.

With the introduction of vertical retorts for the carbonization of coal it was soon recognized that the physical properties of crude tar had changed as compared with tar from horizontal retorts, and that an improvement was necessary in order to compete with imported bitumen.

As a result of protracted experiments refined tars have been put on the market in the various States, and are meeting with the approval of Municipal Councils and Roads Boards. As these refined tars are now approaching in quality for road purposes very closely to imported bitumen we should be in a position to meet competition, especially if some tariff preference were given to Australian products.

The most serious falling off in revenue has taken place with regard to sulphate of ammonia, the prices for which have been falling steadily since 1916. The principal reason for this is the production of synthetic sulphate in Great Britain and continental countries where large quantities have been available for export at very low rates, the effect being gradually to diminish the returns from this residual in the Commonwealth until working costs are now barely covered, leaving capital, depreciation, and overhead charges on the producing plant unprovided for. The London f.o.b. prices to-day are lower than they have ever been, and when the exchange position becomes easier a stage will be reached that it will be unprofitable for gas undertakings to operate sulphate of ammonia plants.

The disposal of concentrated ammoniacal liquor has eased the sulphate of ammonia position somewhat over the past few years, but this is now returning little more than working expenses. Altogether the prospects for future revenue from sulphate of ammonia and ammoniacal liquor are not particularly bright.

In 1920 the returns from sales of residuals in Melbourne equalled 53 p.ct. of the cost of coal and oil, but in 1930 the return was only 33 p.ct. of the expenditure on coal and oil. This position is, of course, affected by the introduction of water gas, but the fact remains that the relief from sales of residuals towards the price of gas has been reduced by about one-third.

Book-Keeping and Accounting.

The necessity of reducing all costs is as imperative in connection with accounting and collecting as with the manufacture and distribution of gas. Just as mechanical means are coming more and more into universal use in the manufacture of gas, so are mechanical methods of book-keeping and accounting now a recognized part of gas office equipment.

Office managers have to be continually on the *qui vive* regarding methods employed in order to keep up to date in efficient means of rendering and collecting accounts. Thus we have addressing machines, ledger posting or book-keeping machines, adding and calculating machines, stamping apparatus, cash registers and receipting machines, duplicating machines, and even printing machines in the modern office equipment.

The methods adopted for dealing with accounts depend entirely on the conditions under which gas undertakings are conducted, and no system can be laid down for standard use. An examination of the methods in operation by the different companies and corporations is instructive, and many hints for improvement may be gathered.

I desire to make reference to the clerical staff which can no longer be regarded as a mere body of pen-pushers. So many business colleges are now turning out book-keepers, accountants, and secretaries qualified by examination that the knowledge imparted in these courses is becoming a recognized equipment for the modern clerk, and junior male clerks should be encouraged to undergo training to fit themselves for higher positions. Then there is the question of remuneration for clerical work. Although a wage is laid down by Wages Board Determination in Victoria for clerks, this has become a minimum, and the fixing of higher rates, especially in a large undertaking, calls for some discrimination. The Metropolitan Gas Company of Melbourne adopted in 1922 a classification scheme drawn up by a committee of principal officers classifying all work according to its relative importance and resting on a base movable in accordance with variation in the quarterly cost of living figures issued by the Commonwealth Statistician. The classification scheme has been working smoothly for 9½ years, and is in charge of a committee of two officers who inquire into any complaints of dissatisfaction and keep the classification up to date. Altogether, the salaries of some 430 male and female clerks are controlled by the scheme.

Costing in Relation to the Gas Industry.

The general principles of, and reasons for, costing in all branches of industry remain fundamentally the same. It is not only desirable, but very necessary, that dependable records be kept of the allocations under detailed headings of all expenditure and income.

There are certain basic features which should be observed in all costing records, and summarized briefly these are:

1. The records kept must be accurate, and should be available within the shortest possible time after the close of the period to which they relate.
2. The figures produced under the costing system in operation must be in complete agreement with the actual entries in the financial books of the concern or be capable of direct reconciliation therewith.
3. Only such information should be produced as is essential to the efficient control of the business.
4. Conditions in industry are constantly changing, and this phase should be watched to ensure that such changes have not rendered the costing system out-of-date or unsuited to the needs of the moment.
5. Costing data and statistical information should be presented to the management as frequently as possible.
6. The method of drawing up statements and the forms used should be thoroughly discussed with, and approved by, the officers for whose information they are prepared.
7. All officers concerned with costing data should be regularly consulted with a view to improving and altering the system in operation to keep pace with changing conditions.

The detail to be provided by the system of costing applied to any industry is governed primarily by the more or less standard methods of production employed. Notwithstanding this, a surprisingly large variety of ideas is met with when records compiled with regard to similar industries are placed side by side.

This is usual in the vast majority of industries where the executive of one concern, in open competition with similar concerns, considers that competition can be best met by pursuing investigations along certain lines, and thus control the operations of one concern in such a manner as to thereby gain a distinct advantage over competitors. This condition does not obtain in the Gas Industry, as we find practically no competition between various undertakings, and thus an excellent opportunity is afforded of making a definite attempt at standardizing as far as possible the method of costing.

It seems very advisable that some means be provided for regular discussions between representatives of the various undertakings at which interchange of ideas would undoubtedly result in a general benefit.

It would appear that the most suitable basis for Gas Industry costing is the statutory forms of account in which the natural divisions of the revenue accounts are gas manufacture, distribution of gas, rents, rates and taxes, management, and miscellaneous charges and interest, against which are the receipts from gas sales and the net return from the sales of residuals.

As mechanical methods are largely in use, the question of interest charges on capital cost and provision for replacement have to be considered in practically every section of manufacture and distribution of gas as well as in the recovery and handling of bye-products. It is therefore essential that an inventory of plant be kept under suitable headings showing the capital cost of each item of plant, together with the applicable rates of depreciation.

Once installed, the properly organized costing department functions very smoothly and requires only a moderate staff even in the larger gas undertakings. A calculating machine with an efficient operator can perform a considerable amount of work under careful supervision, and the benefits derived from the utilization of such promptly produced information will be apparent to all.

It can be assumed that every gas undertaking produces statements of costs at least once or twice in each year, but in view of the importance to-day of the Gas Industry as a firmly established public utility it is imperative that in all of the larger undertakings at least the information which a reliable costing system alone can produce should be available from week to week.

This information is invaluable in exercising an efficient control over all expenditure and in detecting evidences of

waste before such can assume serious proportions. A sound basis is provided from which it is possible to plan ahead and to formulate development policy.

The relation of selling price to current costs is immediately available, and any fluctuations in cost likely to have any bearing on the selling price can be fully investigated and any adjustment made without delay.

Statistical and costing records will prove immensely valuable in providing information for Governmental inquiries, industrial court actions, tariff investigations, and where a company maintains its own mainlaying department, repairs staff, and/or meter repairing shop, it is possible to make accurate comparisons with prices quoted by outside firms for similar work.

It is perhaps unnecessary to add that every care should be taken to guard against the installation or continuance of a costing system that is not thoroughly reliable, as a grave risk would be taken in accepting figures which may later be proved fallible.

Gas Legislation.

It is fitting, perhaps, that I make some reference to proposed legislation affecting the Industry.

Gas Acts governing the operations of the principal undertakings in four of the States of the Commonwealth have been in force for many years—indeed, the Australian Gas Light Company obtained its charter just over 94 years ago, while the Act amalgamating three Melbourne Companies under the name of "The Metropolitan Gas Company" became law nearly 54 years ago, although the first Melbourne works commenced manufacturing operations as far back as 1856. In two of the States there are at the present time suggestions for amendments of the existing enactments.

Being a Victorian, I may perhaps be pardoned for referring, first, to the extraordinary proposals which our local legislators have brought forward in a Bill known as "The Gas Regulation Bill," introduced into the Victorian Legislative Assembly in May last. Primarily, this Bill applies to three undertakings only, but, if it becomes law, any company which sells more than 25 million c.ft. per year may subsequently feel the grip of its tentacles.

The ingredients of the Bill are decidedly socialistic in flavour, and, therefore, distinctly unpalatable. It is proposed that the control of the Industry shall be handed over to one man, who is to be known as the "Gas Referee."

One would imagine that with an industry of such a highly technical nature, the Referee would be required to possess some special qualifications to enable the varied duties with which he is charged to be performed in a manner which would engender confidence in those who will be most vitally affected by his decisions; but the framers of the Bill, with an extraordinary lack of foresight, or, shall I say, intelligence, have simply provided that this "super dictator" is to be "a competent and impartial person" appointed by the Government for the time being in power.

Not only can this one Referee determine the calorific value, fix the standard of purity, and decide the minimum pressure, as well as exercising all kinds of control over the manufacturing operations of an undertaking, but he can fix the price of gas and determine the rate of dividend which can be paid; indeed, the position sought to be created is absolutely intolerable.

We, in Victoria, are taking all steps possible to see that such drastic and uncalled-for legislation as is proposed shall not be enacted.

It is of interest to note also, according to Press reports, that the Government of New South Wales, with the idea of obtaining a reduction in price, contemplates the introduction of amending legislation in that State.

It is, at least to me, a remarkable thing that there should be such restricted vision in a matter of such great consequence. Here is an Industry playing a most important part in the everyday life of the community; yet sets of party politicians are doing their best to harass it in every conceivable manner, without the slightest appreciation of where their actions, if allowed full sway, would lead the public. It can be said, without fear of contradiction, that legislation such as is proposed will have the very opposite result to that which these party politicians so glibly state will be accomplished.

The old idea that gas sells itself has been dispelled for ever, and gas undertakings have now to face competition of the keenest, and often unfair, nature. That competition of itself protects the public from being charged a price higher than is absolutely necessary to enable proper service to be rendered to the consumer and provide a reasonable return on the capital employed.

The Gas Industry, over a period of years moving towards the century mark, has developed in Australia a much-needed public utility. Legislation has been framed and enacted, and on the strength of what may be regarded as definite parliamentary assurances, investors have made possible the necessary growth of the Industry.

Are these people who, in good faith, placed their money—very often their life savings—in what was considered sound security, now to have their rights impaired to satisfy the socialistic ambitions of a mere handful of politicians, who neither understand, nor want to understand, either the importance of the Industry or the high ideals for which it stands? The great public service the various undertakings have rendered for so many generations has been lost sight of completely.

Never was there a time in the history of Australia when legislation was less required. All the Industry asks is to be left at peace to continue doing what it has done for so long—*i.e.*, supplying a necessary commodity at a fair price commensurate with the difficulties with which it is faced, and its obligations, not only to consumers, but also to those who have found the millions of money necessary for promotion and development of the Industry.

Conclusion.

As many of you are aware, I am shortly retiring from active participation in the affairs of the Metropolitan Gas Company which I have served for fifty-five years. This then is in the nature of a valedictory address, and I desire to record an expression of my best wishes for the continued advancement of an old and honourable Industry.

The Application of Oil Filming to a Wet Capacity Meter

By S. R. Preston, Adelaide

[From a paper before the Australian Gas Institute]

The subject of meters is one of absorbing interest, and while both the wet and dry types have their respective advocates, it cannot be said that finality has in any way been reached with regard to the production of a meter entirely suitable for present-day requirements. Generally speaking, a meter before being connected on the district has only had sufficient gas passed through it to comply with some form of standard test, yet it is expected to function satisfactorily, unlubricated and unattended, over a period of years.

The dry meter has given very good service in the past, while in its form as a capacity meter it is capable of such fine adjustment as to give accurate registration over a wide range of pressures, and varying rates of flow; and in view of this the writer was of the opinion that it offered the best possible scope for improvements in future design. As a result of an investigation, however, spread over a period of three years, during which time careful attention was paid to the actual performance of these meters under working conditions, he has been forced to the conclusion that the accuracy of works tests cannot be taken as giving any indication of the efficiency of this type of meter when operating under the varying conditions prevailing on the district.

In no circumstances whatsoever are the "K" type capacity meters of the South Australian Gas Company considered to be inferior to those of other manufacturers, for, if works tests could be taken as affording any criteria of efficiency, then they are definitely superior.

However, in spite of the apparent greater efficiency of the "K" meters the marginal difference in their favour does not appear to be maintained in practice, and the only explanation which may be advanced is that the diaphragms of all types are equally affected by the various deleterious constituents of the gas.

A brief survey of some of the factors responsible for the changed attitude of the writer regarding meters will probably be of interest.

Some two or three years ago the Company was greatly concerned with the number of meters which had to be disconnected for non-registration, and although steps have been taken which have since greatly reduced the number so changed, the position cannot even now be said to be entirely satisfactory. In some cases these meters, de-

signated N.R.C. (non-registering complaints), have a habit of "running slow" over a lengthy period. After registering more or less uniformly over an extended period a marked drop occurs in the consumption, for which the consumer's explanation is usually accepted. But such explanations eventually prove in many cases to be very misleading, as the first reading of the new meter generally shows the normal consumption prior to the original meter reading slow.

Some time ago an analysis of the tests of a number of meters which were changed for non-registration was made, with the following results:

Found correct within the limits of the Act	21
Registering fast	359
Not indicating	1196
Registering slow (up to 11 p.ct.)	422
Registering slow (in excess of 11 p.ct.))	87
Total	2085

Of the above, those not indicating (1196) can definitely be designated N.R.C. Of the balance of 889, there were 802 either registering correct, fast, or slow up to 11 p.ct., and 90 p.ct. of the meters which were indicating did not give a test at the works which could be taken as affording any indication of their performances on the district. The writer has held the opinion for some considerable time, that any test of a meter after it has been disconnected from the district is to all intents and purposes of little practical value.

It is not a rare occurrence for new meters to fail to register, necessitating a further change, although the consumer has notified that the usual amount of gas has been consumed; while, on the other hand, the first reading of a new meter has occasionally been challenged by a consumer, and on Government Test has been found to register fast.

The balancing of the consumptions of check meters against a master meter is another fruitful source of trouble, and, although the doubtful meters have been changed, and the distribution department cannot locate any faults, the trouble goes on month after month.

One of the advantages claimed for the dry meter is that it absorbs very little pressure, and while this may be perfectly true with a new meter, it is seriously open to question, as to how long the advantage is maintained after the meter has been connected in position.

Tests on Meters Changed for "Not Wanted" on District Less than Twelve Months.

No.	Initial Capacity. 5/10ths In. Pressure.	Capacity on Re-test. 5/10ths In. Pressure.
	C.Ft. per Hour.	C.Ft. per Hour.
1	180–185	144
2	,,	142
3	,,	160
4	,,	170
5	,,	174
6	,,	136
7	,,	165
8	,,	160

Although the design of the ordinary dry meter does not appeal to one from the point of view of engineering construction, yet its main disability appears to lie in the diaphragms, and although distinct improvements have been made in this connection in recent years, the writer still feels that there is little justification for classifying the dry meter as a precision instrument in the ordinary accepted sense of the word.

Wet Meters.

The difficulty then arose as to what form the design of a suitable meter should take, as modern gas practice demands a capacity meter. The maximum demand of an ordinary domestic consumer is probably somewhere in the vicinity of 120 c.ft. per hour, to pass which, in ordinary circumstances, it would be necessary to install a 20-light wet meter, as meter manufacturers contend that a meter should not be worked beyond its rated capacity. The cost of such a meter, however, would impose serious limitations on any policy of future extensions.

The compensating drum, ingenious in its conception, is, by virtue of its actual construction, totally unsuitable for use in a capacity meter, and, having due regard for the factors governing registration and capacity, it was felt that the duplex wet meter offered the best possible solution for the design of a suitable domestic meter.

Some time ago the writer investigated the registration of the duplex meter, and was forced, like others, to the conclusion that it was subject to fast registration, the extent of which depended upon the actual velocity of the gas, and on the number of cubic feet of gas passed continuously through the meter. Alterations were made in design, as a result of which it was found possible to increase the effective range of accurate registration, and the improvements so devised have been embodied in a new meter of entirely novel design.

Wet Capacity Meter.

Having in mind that, with a wet meter, one source of recurring expenditure is that of watering *in situ*, it was decided to adopt a new principle in meter design—viz., that of maintaining an oil film on the top of the water, in order to retard its evaporation. From tests which have been made, it is confidently expected that, under practical working conditions, the meter will only require additional water every two or three years. The meter now described has been designed specially for the application of oil filming (figs. 1, 2, and 3).

The gas enters by the inlet connection (1), into the valve chamber (2), through the valve (3) to the auxiliary box (4), and thence by the vertical duct (5) to the front gallery (6), which is completely enclosed and acts as a pressure compensating chamber. The valve (3) is controlled by the float (7), working in a well (8), which is open at the top, on the same principle as a King's gauge. When the meter is passing gas the water in the front gallery (6) is depressed, as it is subject to inlet pressure, while that in the annular space in the well (8) tends to rise as the water therein is subject to outlet pressure gas, the difference in the two water levels being equal to the pressure absorbed by the meter at any given rate of flow. Accordingly, the float tends to open the valve (3) further as the velocity of the gas through the meter increases.

At the other end of the front gallery is an overflow box (11), open at the top to the inlet pressure gas, but the water in which is not in connection with that in (6). The gas is then led to the spout (13), through the duct (9), a continuation (10) of which is sealed in the reserve water chamber (26). After passing through the measuring drum (14) the gas leaves the meter by the outlet connection (27).

On the right of the front gallery (6) is an open well (20) in direct communication with the water in the measuring chamber, by means of a slot (28) in the partition plate (18), and which extends above and below the normal water level. The excess water and oil from (20) flow through the adjustable connection (21) into the overflow chamber (11), and thence by the overflow pipe (12) to the reserve water chamber (26). An oil film (29) is maintained on the top of the water in the measuring chamber, the thickness of which is regulated by the difference in the levels of the overflow pipe (12) and the connection (21). A film of oil is also maintained in the overflow chamber (11) by a seal, as shown on the drawing. The oil, in the first place, is poured into the measuring chamber (19) through the outlet connection (27), and when the water is added, sufficient oil passes through a hole (30) in the partition plate effectively to cover the top of the water in the front gallery (6). The surplus oil automatically flows to the reserve water chamber (26), and forms a film on the water in this compartment. The index (25) is operated with the ordinary worm and wheel, the index spindle having a short seal tube (15) fastened to the top of the gallery. The spoon lift is all assembled on the casting (17), and is operated through gearing by a worm (16) on the index spindle (24). By this means oil and water are elevated from the reserve chamber (26), and emptied into the well (20), to make good the loss due to evaporation. The ratio of the gearing of the spoon lift to the revolutions of the drum shaft is approximately 1 : 70, so that with a capacity of 0·21 c.ft. per revolution of the drum, the spoon lift will make a complete cycle of operations for every 14·7 c.ft. of gas passed through the meter, though this may be varied as required. This ensures that the meter, working continuously, must pass approximately 2000 c.ft. of gas before its accuracy will be affected approximately 1 p.ct., and thus effectively overcoming defective registration by elevating too much water from the reserve water chamber. Once the meter ceases to pass gas the various levels automatically adjust themselves to their normal positions.

A sealed filling tube (23) is provided, passing through two small rectangular boxes at the corners of the front gallery. The overflow pipe (31) in the reserve water chamber is fitted to the front plate for purposes of mechanical construction.

Special care has been taken in the selection of the materials for the various parts of the meter. The case will be made of lead-coated iron, and the drum of block tin (tin 93 p.ct., antimony 7 p.ct., copper and lead, a trace). It has been decided to use staybright steel for the drum shaft and worms, as staybright steel does not possess magnetic properties. Stainless steel is magnetic, and in contact with brass would set up galvanic action. Man-

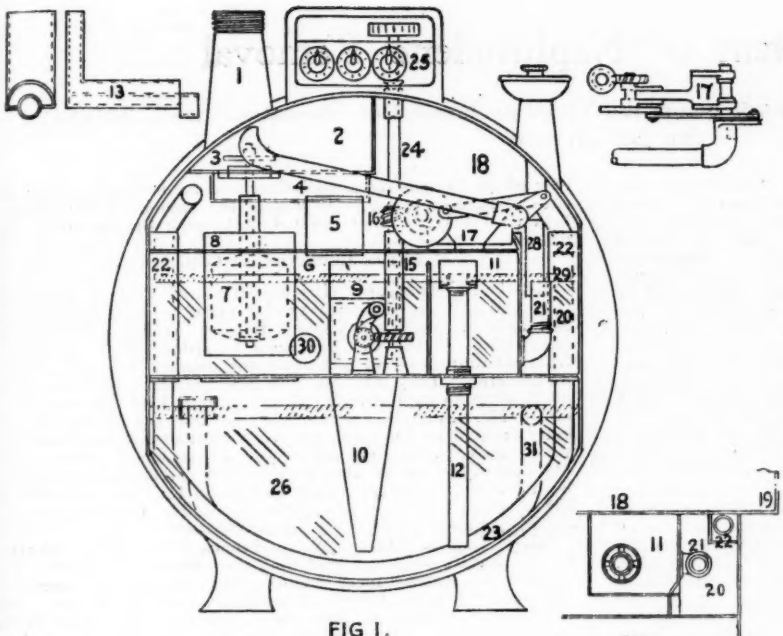


FIG 1.

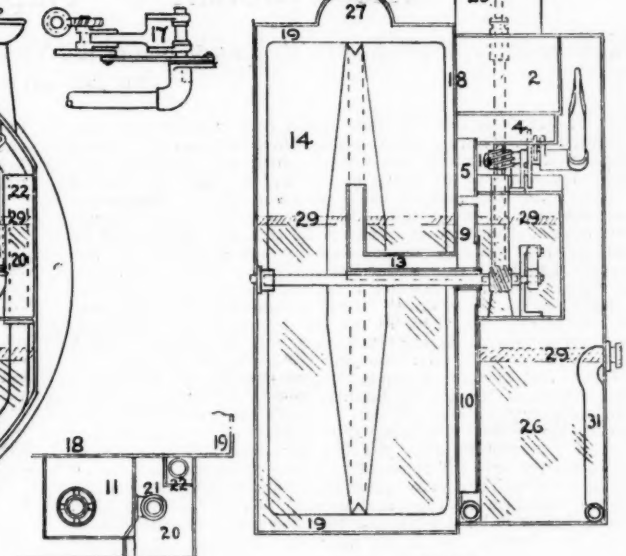


FIG. 3.

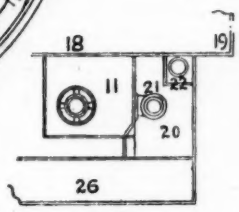


FIG.2.

NEW WET METER WITH OIL FILM.

ganese bronze is to be used in the wheels, while the various castings will be made of phosphor bronze.

Construction.

With a view to simplifying the cutting out and forming, all parts as far as possible are of square construction, which is in turn an aid to the erection and assembly of the meter.

The body of the meter is in two halves, consisting of the drum chamber, and an extension front, which includes the valve boxes, front gallery, and reserve water chamber.

The partition plate (18) is first worked off from a template, showing the relative positions of the various parts, and then clamped down to a small turntable. The front chamber is soldered to the partition plate, the front gallery placed in position, and after the other parts and fittings have been assembled, the partition plate is fastened to the drum casing. The drum is then placed in the measuring chamber, and the back and front plates are finally fitted in position. The main advantage in mounting the various parts on the partition plate is that " straight " soldering may be used, which greatly reduces the risk of leaky joints.

Registration.

Allowing for a probable maximum consumption of 120 c.ft. per hour for the ordinary domestic consumer, there is an effective margin in accurate registration of 50 p.ct. above the maximum load, but this would be further increased if advantage was to be taken of the full 5 p.ct. variation in registration allowed by the various Gas Acts.

The meter absorbs very little pressure, the amount being only 5/10 in. at 120 c.ft. per hour.

The dimensions of the meter are:

Diameter	13¾ in.
Depth	9¾ ,,
Height	15 ,,

The space required for the meter is thus 122·6 sq. in., which is 15 p.ct. less than that occupied by a 5-light wet meter (13⅞ in. by 10¼ in. by 16¾ in.) with a rated capacity of only 30 c.ft. per hour, and practically 50 p.ct. less than that taken up by an ordinary duplex meter of slightly less working capacity.

At increased rates of flow it is possible to make a meter read either fast or slow, and by certain modifications this meter may be made to give a straight line registration at all velocities. At low rates of flow the accuracy is governed by the height of the overflow pipe which is at a fixed level, while at the higher velocities the registration is dependent upon the relative areas on the inside and outside of the drum. We have a somewhat parallel case with a dry meter, where the registration may be varied in the same manner simply by altering the position of the tangent in relation to the throw of the crank.

Oil Filming.

In designing this meter with a view to a possible alteration in meter policy, it was necessary to take into consideration the nature of the water as supplied in Adelaide and the surrounding districts. The total solids in this water varies from 32-42 grains per gallon according to whether a wet or dry season is experienced, and in view of this it was considered that the frequent addition of water *in situ* to make good the loss due to evaporation would only be detrimental to the efficient working of the meter on the district. To obviate this, it was therefore decided to adopt the principle of oil filming.

One of the main essentials of an oil for this purpose is that it should not emulsify, and it must be one which will not to any great extent retard the rotation of the drum. Variations in viscosity affect the capacity of the meter, while the specific gravity of an oil also affects the rate of flow at any given pressure. A third factor to be considered is that of flash point.

Of the many oils tested it was found that K1 transformer oil, as supplied by the Shell Company of Australia, Ltd., gave the best results.

Specification—K1 Transformer Oil.

Viscosity at 67° Fahr.	94 secs.
Specific gravity	0·83
Flash point	160° C.

Distillation.

	P.Ct.
X —300° C.	3
300°—350° C.	59
350°—375° C.	36
Residue and lost	2
	100

The amount of oil required for a meter of this size is 1¼ pints.

The effect on capacity with variations in the thickness of the oil film is practically negligible, the actual loss being dependent upon the desired rate of flow. This loss is greatest at the lower rates, and as the pressure absorbed at such rates is very small, any additional pressure absorption may be disregarded.

A series of registration tests was carried out with ⅛-in. and ¼-in. oil films, but these did not in any way differ from those obtained when using water only as the measuring medium.

A number of these meters are now under construction with a view to installing them on the district, and as soon as this has been done, it is proposed to proceed with the design of the larger sizes embodying the same principles in their design as are incorporated in the meter here described.

The Problem of Naphthalene Removal

Discussion on Paper by Mr. B. Thorpe before the Yorkshire Junior Gas Association—see "JOURNAL" for Jan. 27, p. 196

Mr. F. FIRTH (Chief Chemist, Leeds Gas Department) congratulated Mr. Thorpe on a paper which he was sure must represent a considerable amount of work and thought, and which, one was glad to know, had gained for him the coveted reward of the Diploma of the Institution of Gas Engineers. Mr. Firth was of the opinion that gums were largely formed from much lighter bodies existing in the gas than could be removed by a washing process such as was described by Mr. Thorpe. The high vapour tension precluded their removal in this way in the same manner as it prevented the removal of CS$_2$ from gas by oil washing. He also suggested that the probable loss of calorific value in the gas by removal of only the heavier unsaturated hydrocarbons was not appreciable, which was a point raised by Mr. Thorpe. If one considered the work of Hoffert and Claxton it suggested that possibly the difficulties with gums might be met by the introduction into the gas stream of an inhibitor, such as phenol. In fact, he understood that in some cases phenol was being added to gas oil for naphthalene removal. It also appears possible that one of the causes of gum formation was the removal of bodies from the gas, by oil washing, which previously retarded gum formation. Dealing with the question of the economics of benzole recovery, Mr. Firth stated that he did not consider the ordinary calculations of gas into holder was a fair basis for deciding the revenue value of benzole recovered. In the first place it led to the conclusion that at times of lowest gas output the charge to the benzole plant would be the heaviest, which was obviously a false conclusion when considering the possibility of an increased load. He suggested that a fairer basis would be to charge the B.Th.U. at the net price of coal. This would in the majority of cases show benzole recovery as more profitable than the other methods of calculation.

Mr. C. L. W. BERGLIN (Leeds) said that he would like to have further details of the methods used for estimation of naphthalene in the coal gas.

Mr. THORPE then gave further information on the details of the test.

ESTIMATION OF NAPHTHALENE.

Mr. BERGLIN continued by saying that certain investigations undertaken in a gas-works in Australia, with which he had been associated, showed that it was difficult to get an accurate result by the ordinary picrate method, and that certain discrepancies had been discovered by them. At present they were using a method which involved the absorption of the naphthalene from the gas in ethylene-glycol. The naphthalene was then distilled off and either weighed direct or precipitated with picric acid in the ordinary way. This method gave results sometimes considerably higher than the direct picrate method. Mr. Berglin also mentioned that investigations on gums had been undertaken by Mr. Andrews, of the Metropolitan Gas Company, Melbourne, which were reported to the Australian Gas Association in November, 1930. The speaker also gave details of the method of estimating naphthalene in gas oil as followed by his Australian colleagues.

Mr. A. W. ELLIOTT (Elland) remarked specially on the difference between the naphthalene content of the gas at the outlet of the washer and that of the town gas at the same time. He also would like to have more information as to how the plant in operation at Huddersfield helped to prevent the deposition of resinous substances on governor valves.

Mr. G. A. WINFIELD (Sheffield) also inquired for details of test for naphthalene. He asked whether there was any sludge formation in the washer when operating with continuous circulation of oil.

Mr. D. T. LIVESEY (Doncaster) inquired as to the routine method of distinguishing between stoppage complaints due to naphthalene and other sources. He mentioned, in connection with Mr. Elliott's question, that they were quite familiar with the phenomenon at Doncaster, as they took two years to clear up the district after installing their naphthalene washer, this period agreeing with that estimated by Messrs. W. C. Holmes, who constructed the washer. It was evident that the district must be cleared of naphthalene by picking it up again in the gas.

Mr. J. RICHMOND (York) remarked that he had recently had brought to his notice samples of oil obviously carried from naphthalene washers, which had been collected from holder syphons. These samples had undergone a physical change, and the oil had become more viscous and darker in colour, as compared with ordinary spent oil. Had Mr. Thorpe, during the period when he was running his naphthalene washer, before regenerating his oil, come across similar physical changes in the oil?

Mr. C. H. CHESTER (Wakefield) said that at Wakefield they used a slight excess of gas oil in the washer, and admitted the oxygen before the washer, which came before the purifiers. They found that the naphthalene washer in this position reduced troubles in purification, and that their gum troubles, since putting the plant into operation, had been actually reduced, as well as their naphthalene complaints reduced to a negligible figure. They had no drying plant on their works, but he would like Mr. Thorpe's opinion as to the possible effect of washing the gas for naphthalene and for benzole in the presence of excess oxygen. He was of the opinion that at Wakefield their C.W.G. plant assisted in keeping the gas of an oily nature.

A 75 P.CT REDUCTION IN COMPLAINTS.

Mr. J. E. WAKEFORD (Brighouse) stated that at Brighouse they had just started up a similar plant to that described by Mr. Thorpe. They had also a "Dri-Gas" plant, and the combined effect of the two had been to reduce their complaints from all sources by 75 p.ct., and the number was still steadily diminishing. They had not had any trouble with gummy deposits prior to naphthalene extraction, but these developed soon after. He was of the opinion, however, that the amount of difficulty created by the gums was very considerably less than that which they previously had from naphthalene. Although it was only a few weeks since their gas oil regeneration plant had been put into operation, they had found that the operation of the governor valve was already more reliable, this being proved by an examination of the pressure charts.

Mr. C. COOPER (Messrs. W. C. Holmes & Co., Ltd.), referring to Mr. Firth's remarks, said that the problem of gummy substances was rather more complex than had been suggested. For example, he had received samples of gum from every type of carbonizing plant in the country, and they were much of the same character, except where the oxidation was incomplete. The lighter hydrocarbons mentioned by Mr. Firth were certainly liable to form resin, but he did not think that they were always the essential part of such formations. Most of the discrepancies might be explained if it could be proved that the lighter hydrocarbons were polymerized before they got as far as the naphthalene washer. This was quite probable, as he had perfectly typical gums which had been extracted from ammonia liquor and from spent oxide. That the heavier hydrocarbons were also liable to form these gums appeared to him quite probable in view of the fact that they had been actually prepared from the heavy portion of a crude benzole. It was, therefore, by no means illogical to attempt the extraction of the heavier unsaturated hydrocarbons. Moreover, the method described by Mr. Thorpe might derive some of its success from the fact that any inhibiting agent present might be accumulated in the closed circuit of gas oil instead of being extracted and rejected as in the normal process of naphthalene washing. With regard to Mr. Firth's suggested basis for the evaluation of benzole in the gas, for the purpose of determining the advisability of benzole removal, he would only emphasize that Mr. Firth's value would in the majority of cases be lower than that suggested by Mr. Thorpe. The difficulties with the naphthalene test in gas mentioned by Mr. Berglin reminded him of some observations made in a town in the South of England where the naphthalene found in the town gas was consistently higher than that at the outlet of the washer, even after such a period had elapsed that the naphthalene in the mains should have been removed. There was a suggestion made that some of the polymerized hydrocarbons, which would not give the picrate test in their normal state, would form picrate precipitate after polymerization.

A MEMBER drew attention to the prevalence of gum deposits in certain coke oven gases distributed for town consumption. In these cases, there was benzole removal and also an attempt at naphthalene removal, and he cited a very low oxygen figure. Could Mr. Thorpe offer any explanation of such a case?

THE AUTHOR'S REPLY.

Mr. THORPE, in reply, said that he could assure Mr. Firth that they believed they were on the right lines, because of the results actually obtained in practice. Mr. Firth had raised an interesting point regarding the valuation of benzole, which might be worth further discussion. With regard to Mr. Berglin's remarks, he was doubtful whether any serious errors occurred in the ordinary naphthalene tests using two bottles when the naphthalene content was reasonably low. In any case the important thing was to have a reliable comparative test if they could be satisfied that the outlet naphthalene figure was safe to send out on the town. He would like to have more information as to the alternative method of tests described by Mr. Berglin.

In reply to Mr. Elliott, Mr. Thorpe pointed out that the naphthalene already out on the district could only be picked up by gas which was deficient in naphthalene. Therefore, it must follow that the naphthalene content of the gas would rise on its way to the consumer.

Mr. Elliott's further question as to the principle which allowed of the removal of gum forming substances was the consideration as to which hydrocarbons could be removed by definite ratios of oil circulation, and that ratio selected was capable of removing high-boiling substances, but would leave the low-boiling hydrocarbons in the gas.

Mr. Winfield's question as to the formation of sludge could be answered by saying that they had actually had less sludge in the machine since the oil circulation was introduced.

With regard to Mr. Richmond's question about the nature

of oil found in syphons, Mr. Thorpe cited the case of an oil deposit found in the base of the governor, which was distinctly different from what one would expect to be deposited from the gas, or derived from the gas oil.

Mr. Chester's interesting communication was one which Mr. Thorpe would like to investigate further. At the moment, however, he had no information which would allow him to form an opinion as to whether Mr. Chester's method of working did actually contribute to the bringing-down of gums. He would in any ordinary circumstances be inclined to insist on the lowest possible oxygen content in distributed gas, but Mr. Chester's conditions were different and might demand a high oxygen content at that point.

He was glad to have Mr. Wakeford's support and confirmation of the benefits to be expected by working a naphthalene washer in this manner.

With regard to the question of gum formation from coke oven gas, it would not be possible to give an opinion in any specific case without careful consideration of carbonizing and distribution, as many coke ovens which sent out gas for town use were not able to make a complete benzole removal on account of the necessity of adjusting calorific value.

In conclusion, Mr. Thorpe acknowledged the assistance given him by Messrs. Holmes & Co., the designers of the plant, and to Mr. Singleton for permission to publish the figures from the works records. He would also mention his colleagues on the gas-works staff, without whose assistance this paper could not be written.

VOTE OF THANKS.

On the motion of Mr. CHESTER, seconded by Mr. ELLIOTT, a hearty vote of thanks was accorded to Mr. Thorpe for his valuable paper.

In reply, Mr. THORPE referred to the difficulty of condensing a long thesis for the purpose of a meeting, and thanked the members for their kind reception.

A vote of thanks was also accorded to Mr. Singleton and Mr. Neverson for their help and hospitality during the meeting.

REGISTER OF PATENTS

Carburetted Water Gas Plant.—No. 355,490.

DEHN, F. B., of London.

[A communication from the Gas Machinery Company, of Cleveland, Ohio.]

No. 23,856; Aug. 8, 1930.

The generator shell is connected with a carburettor shell by a single duct, characterized in that the duct opens into the top of the carburettor with the axis of the opening in parallelism to the axis of the carburettor, and that the means for supplying oil to the carburettor extend through the opening and discharge downward into the carburettor.

The invention particularly relates to improvements by means of which a uniform heating of the lining of the carburettor is obtained: as also a uniform heating of the checker brick, particularly obviating excessive burning or deterioration of the lining in certain sections of the carburettor.

Automatic Control of C.V.—No. 356,425.

ASHWORTH, R., and TILDESLEY, W. R. D., both of Tamworth.

No. 24,139; Aug. 12, 1930.

This invention relates to a device for automatically controlling the calorific value of gas being recorded by a recording or indicating instrument. A governor is provided the space within the bell of which or beneath the movable member of which is connected to the inlet side of an exhauster by way of a connection in which is fitted a needle adjusting valve. Coupled to the connection is one end of a connecting pipe, the other end of which terminates in a controlling valve which may consist of telescopically related tubular members—say, of a fixed slotted tube the top of which is sealed and an outer tube slidable freely over the slotted tube. The movable valve member—*i.e.*, in the particular case the outer tube—is connected by a filament led over a pulley to the arm of the recorder, and is also counterbalanced by weights attached to the end of a second filament also led over the pulley. Depending on the extent to which the slot is uncovered by the outer tube, the vacuum within the bell will vary. An arm movable with the governor bell is connected to the controlling source of dilution.

Gas Washers.—No. 357,712.

WATSON, S. G., HENSHAW, D. M., and W. C. HOLMES & CO., LTD., all of Huddersfield.

No. 23,662; Aug. 7, 1930.

The object of the invention is to provide an improved construction of brush element for use in connection with rotary washers. The fibres of the brushes are vertical. The brush elements may comprise side members adapted to be arranged vertically within the apparatus with transverse members extending between them, and secured to the transverse members knots of bristles extending in a direction generally parallel with the side members. Conveniently, the brush elements are relatively narrow so that a plurality of them may be arranged side by side within the apparatus, the brush members resembling hurdles, to the transverse members of which are secured bristles.

With some or all of the transverse members there may be associated knots of bristles adapted to extend in an upward direction when the brush member is in position in the apparatus and also bristles extending in a downward direction.

The transverse members of adjacent brush elements may be arranged so that when they are appropriately positioned within the chamber they will be in staggered relationship.

Normally the brush elements will be arranged in a horizontal plane at right angles to the direction of travel of the gases through the chamber, and on the walls of the chamber there may be provided supports on which the side frame of the brush elements may rest.

Safety Device for Gas Heating Burners. No. 360,352.

JUNKERS, H., of Dessau.

No. 16,797; June 9, 1931. Convention date, Aug. 4, 1930.

This invention relates to a safety device for gas heating burners having numerous flames distributed over an area and employed to some extent for water heaters or heating stoves, and in which a valve controlling the supply of gas to the main distribution pipe of the burner is controlled by a thermosensitive member which is influenced both by the heat of a by-pass flame and by the heat of the burner. The device is so designed that the valve is held open so long as the by-pass flame burns, and is closed in the event of the by-pass flame being extinguished when the burner is not in operation, so that in this latter case no gas can reach the burner.

The gas valve, controlled in known manner by a bi-metallic strip, is housed in the gas supply pipe firmly connected with the main distribution pipe of the burner, and the bi-metallic strip and by-pass burner are similarly attached directly to the main distribution pipe, in such a way that, over the major portion of its length the bi-metallic strip extends, approximately horizontally, between the flames of the burner, and is also exposed to the heating influence of the by-pass flame. Thus, the main distributing pipe forms, to a certain degree, the rigid connecting member for all parts of the safety device. The movement of the bi-metallic strip is transmitted to the gas valve housed in the burner supply pipe by means of an approximately vertical valve spindle which passes through the wall of the main distributing pipe at a point within reach of the flames of the burner. In this arrangement, the aforesaid point does not require to be made gas tight, since any issuing gas will be ignited by the flame of the burner and thus rendered harmless. In order to prevent damage to the bi-metallic strip by the resulting small flame, a small auxiliary valve may be provided at the outer end of the valve spindle, this valve closing the passage when the valve of the safety device is fully open. By this means, frictional forces impeding adjustment can be completely avoided, so that slight forces are adequate for actuating the valve, and a high degree of sensitiveness is attained in the entire device, while escapes of gas are prevented.

Strip Lanterns.—No. 362,189.

FOSTER & PULLEN, LTD., GRANGE, A., and GILL, A., all of Bradford.

No. 38,975; Dec. 29, 1930.

This invention relates to "strip" lanterns where a plurality of lights are arranged in alignment (in some cases alignment is not adhered to). The lanterns for this class of light are provided with a depending frame with a part or parts hinged to the upper part of the frame or to the main body, and it has been customary to construct such frame with straight sides to accommodate sheets of glass to the sides and ends, the general formation being triangular. It has been found that plain straight sheets of glass are apt to break or crack due to uneven contraction and expansion; and it is the object of this invention to arrange and construct a lantern frame characterized by curved glass supporting side members. This construction does not interfere with the usual triangular formation, but enables the use of curved longitudinal panes of glass, the end panes being flat. This construction and arrangement give increased life to the glazed portions.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

A distinctly more optimistic atmosphere was apparent on the Stock Exchange during the earlier part of last week, and prices of many securities improved, especially in the gilt-edged section. In the absence, however, of any reduction in the Bank Rate on Thursday, coupled with the disturbing news from China, business declined, and prices in most markets closed with little change either way compared with the previous week.

There was no loss of interest, however, in the Gas Market. Prices generally remained firm, and several issues showed improvement. Among ordinary stocks, Alliance and Dublin gained a further 1 point to 105½; Imperial Continental rose 5 points to 330; Uxbridge 5 p.ct. 2 points to 104½; Liverpool 5 p.ct. gained a fraction on the local Exchange; while a further batch of debentures recovered the recent *ex* div. reductions. The last-mentioned issues, it will be remembered, suffered somewhat drastically as a result of the financial crisis last year, but are now slowly and surely regaining their former values. Ordinary stocks, however, except in a few isolated cases, have shown little change, and now stand at about the same value as this time a year ago.

Among the ordinary announcements made last week, it is very satisfactory to record that in the case of the Gas Light and Coke Company the rate paid for the two preceding years has been maintained and the carry-forward increased from £122,055 to £139,121, while the Tottenham and District Company proposes a slightly higher distribution. The actual rates are as follows: Gas Light and Coke £2 16s. p.ct., making £5 12s. for the full year, and Tottenham and District a final dividend of 3⅜ p.ct. (against 3 5/16 p.ct.), making 6¾ p.ct. for 1931 (against 6⅝ p.ct. for 1930).

A telegram from Australia states that the net profits of the Metropolitan Gas Company of Melbourne for the past half-year were £107,254 (against £135,380 for the corresponding period of 1930). A dividend of 6s. 6d. per share has again been declared, and £20,000 (against *nil*) added to reserve, leaving a carry-forward of £53,770, against £43,460 last year when £50,000 was transferred to capital account. This information has been forwarded to us by Messrs. John Terry & Co., Agents for the Company.

Further additions have been made to the Stock and Share List this week by the inclusion of the 4 p.ct. and 5 p.ct. debenture stocks of the Mid-Southern District Utility Company; the amounts outstanding are £112,126 and £148,955 respectively, and interest in both cases is payable on Jan. 1 and July 1.

Current Sales of Gas Products.

The London Market for Tar and Tar Products.

LONDON, *Feb.* 1.

There is little change in the values of tar products, which remain as follows:

Pitch is firm at 85s. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon f.o.b., according to specification.

Pure toluole is about 2s. 8d. per gallon at makers' works; pure benzole, 1s. 8d. to 1s. 9d. per gallon; 95/160 solvent naphtha, about 1s. 5d. per gallon; and 90/140 pyridine bases about 3s. 9d. to 4s. per gallon.

Tar Products in the Provinces.

Feb. 1.

The average prices of gas-works products during the week were: Gas-works tar, 31s. to 35s. Pitch—East Coast, 65s. to 70s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 65s. to 70s. f.o.b.* Toluole, naked, North, 1s. 10½d. to 1s. 11d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 11d. to 11½d. Creosote, *ex* works, in bulk, North, liquid and salty, 3½d. to 3¾d.; low gravity, 1¼d.; Scotland, 3½d. to 3¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid, 60's, 1s. 7½d. to 1s. 8d. Naphthalene, £9 to £10. Salts, 55s. to 75s. bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Jan.* 30.

Values of most products remain steady, but the volume of business being placed is disappointing.

Pitch.—Available supplies are very low, and export price is nominal at 70s. to 72s. 6d. per ton f.o.b. Glasgow. In the home market 75s. per ton *ex* works is obtainable.

Refined tar to Ministry of Transport Specification is quoted for prompt and forward delivery at 4d. to 4½d. per gallon f.o.r. works in buyers' packages.

Creosote oil.—Conditions are unchanged in this area, prices being steady all round. B.E.S.A. Specification is 3d. to 3⅛d. per gallon; low gravity, 3½d. to 3⅝d. per gallon; and neutral oil, 3½d. to 3⅝d. per gallon—all *ex* works in bulk.

Cresylic.—Stocks are accumulating and prices are weak. Pale, 97/99 p.ct., 1s. 2d. to 1s. 3d. per gallon; dark, 97/99 p.ct., 1s. 1d. to 1s. 2d. per gallon; and pale, 99/100, p.ct., 1s. 4d. to 1s. 4½d. per gallon—all f.o.r. works naked.

Crude naphtha.—Production is low and value is 4½d. to 5d. per gallon f.o.r. makers' works.

Solvent naphtha.—Market remains dull. 90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 1s. to 1s. 1d. per gallon.

Motor benzole.—Supplies are available at 1s. 3d. to 1s. 4d. per gallon f.o.r. in buyers' tanks.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor "	1	2	"	1	3	" " "
Pure "	1	6	"	1	7	" " "

Overseas Opportunities.

[From the Board of Trade Journal.]

Belgium.

Gas Apparatus, Such as Stoves, Boilers, &c.—An industrialist and agent established at Brussels wishes to obtain the representation of United Kingdom manufacturers of the goods mentioned above, on a commission basis, or for his own account. (Ref. No. 155.)

Contracts Advertised To-Day.

Coal.

The Wallasey Corporation invite tenders for the supply of gas coal. [Advert. on p. 268.]

General Stores (Oils, Shovels, Brass Goods, &c.).

The City of Stoke-on-Trent Gas Department invite tenders for the supply of general stores. [Advert. on p. 268.]

Mantles.

The City of Stoke-on-Trent Gas Department invite tenders for mantles, &c. [Advert. on p. 268.]

Pipes.

The City of Stoke-on-Trent Gas Department invite tenders for the supply of tubes and fittings. [Advert. on p. 268.]

Pipes and Connections.

The Clonmel Corporation invite tenders for the supply of cast-iron gas mains and connections. [Advert. on p. 268.]

Sulphuric Acid and Lime.

The Wallasey Corporation invite tenders for the supply of sulphuric acid and lime. [Advert. on p. 268.]

Trade Notes.

Klönne Holder for Biel.

We understand from Dry Gasholders, Ltd., that the Swiss Licensees of Messrs. Aug. Klönne have taken an order for a Klönne type waterless holder for erection at the Biel Gas-Works, Switzerland. Since the introduction of this type of holder Messrs. Klönne and the various licensees have secured orders for 43 gasholders of this type.

Mannesmann Tubes for Wandsworth.

The British Mannesmann Tube Company, Ltd., have recently obtained an order from the Wandsworth and District Gas Company for a substantial amount of lapwelded steel gas main. The tubes are 18 in. nominal bore by ⅜ in. thick, in lengths of 25 ft. The joint is of the inserted type prepared for welding. The outside of the tubes will be coated with bitumen and afterwards wrapped with jute cloth soaked in bitumen before being wound on the pipes. The total weight of the order will be about 766 tons. This order is regarded as a further indication that British engineers are well alive to the developments which are taking place in regard to the employment of steel tube for the conveyance of fluids and gases. The tubes for the whole of the order will be made from British steel at the Newport Works of the firm.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Jan. 30. (Provincial Exchanges Jan. 29.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
1,551,868	Stk.	Oct. 5	7⅛	7⅛	Alliance & Dublin Ord. ...	103—108	+1	105½—106
374,000	,,	Jan. 4	4	4	Do. 4 p.c. Deb. ...	65—70	...	...
522,655	,,	Aug. 24	7	7	Barnet Ord. 7 p.c.	120—125	...	...
300,000	1	Oct. 19	1/9⅜	1/4⅜	Bombay, Ltd.	15/—17/6	...	16/1½
174,500	10	Aug. 10	9	9	Bournemouth 5 p.c. ...	14⅜—15⅜	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12—13	...	12½—12¾
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	10½—11½	...	...
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	53—58	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	73—78	...	...
210,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	92—97	...	...
357,900	,,	Aug. 24	7½	7½	Brighton & Hove 6 p.c. Con.	114—119	...	116—117
371,880	,,	,,	6¾	6¾	Do. 5 p.c. Con.	104—107	...	...
1,387,500	,,	July 23	5	5	Bristol 5 p.c. max.	88—90[a]	...	...
120,420	,,	Jan. 4	4	4	Do. 1st 4 p.c. Deb. ...	77—79[a]	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	77—79[a]	...	...
828,790	,,	,,	5	5	Do. 5 p.c. Deb.	97—98[a]	...	...
855,000	,,	Oct. 5	8	7	British Ord.	108—113	...	110—111
100,000	,,	Jan. 4	7	7	Do. 7 p.c. Pref.	108—113	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	70—75	+1	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	90—95	...	...
160,000	,,	Jan. 4	5	5	Cambridge 5 p.c. Deb. ...	90—95	...	...
100,000	10	Nov. 30	8	6	Cape Town, Ltd.	8½—9⅛	...	...
100,000	10	Oct. 30	4½	4½	Do. 4½ p.c. Pref. ...	6¼—7¼	...	...
150,000	Stk.	Jan. 4	4½	4½	Do. 4½ p.c. Deb. ...	65—70	...	...
626,860	,,	July 23	6	6	Cardiff Con. Ord.	95—98	...	...
237,860	,,	Jan. 4	2¾	5	Do. 5 p.c. Red. Deb.	91—96	...	...
157,150	,,	Aug. 10	6½	5	Chester 5 p.c. Ord.	87—92[b]	...	...
98,936	1	Oct. 5	1⅔/-	2/-	Colombo, Ltd. Ord.... ...	27/—32/-	...	...
24,500	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	17/—19/-	...	...
609,204	1	Oct. 19	1/3·27	-/10·90	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	...
296,053	1	,,	1/5·67	1/2·54	Do. 8 p.c. Pref.	10/—15/-	...	...
2,073,280	Stk.	July 23	6	6	Commercial Ord.	91—94	...	91½—92½
475,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	51—56	...	...
787,560	,,	Aug. 10	7	7	Croydon sliding scale ...	107—110	...	108—108½
453,100	,,	,,	5	5	Do. max. div.	81—84	...	...
542,270	,,	Aug. 24	10	7	Derby Con.	120—125[c]	...	...
55,000	,,	Jan. 4	4	4	Do. Deb.	65—70[c]	...	...
209,000	,,	Sept. 7	5	5	East Hull Ord. 5 p.c. ...	71—76	...	...
179,500	,,	Aug. 24	5½	5½	East Surrey Ord. 5 p.c. ...	86—91	...	...
155,019	,,	Jan. 4	5	5	Do. 5 p.c. Deb. ...	90—95	...	...
1,002,180	,,	Sept. 21	16½	14	European, Ltd.	103—113	...	104½—106
18,953,033	,,	July 23	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	18/3—19/3[f]	—/3	18/3—19/1½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. ...	53—58	...	...
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	71—76	+1	73½—75
5,694,095	,,	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	55—60	+2	58¾—59½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	93—98	...	98
2,500,000	,,	,,	—	4½	Do. 4½ p.c. Red. Deb. ...	85—90	+1	88—90
161,480	,,	Sept. 7	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	...
82,500	,,	Aug. 24	7	7	Hastings & St. L. 5 p.c. Conv.	95—100	...	...
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	81—86	...	85¼
70,000	10	9 Oct. '30	‡	10	Hongkong & China, Ltd. ...	12—13	...	...
213,200	Stk.	Aug. 10	6	6	Hornsey Con. 3½ p.c. ...	89—92	...	...
2,800,000	,,	Oct. 30	25	15	Imperial Continental Cap.	320—340	+5	321—334
223,180	,,	Aug. 10	3½	3½	Do. 3½ p.c. Red. Deb.	70—75	...	...
235,242	,,	Aug. 10	8½	8½	Lea Bridge 5 p.c. Ord. ...	129—132	...	...
2,145,907	,,	Aug. 24	6	6	Liverpool 5 p.c. Ord. ...	97½—98⅛	+⅛	...
306,083	,,	Jan. 15	4	4	Do. 4 p.c. Deb. ...	78—80[b]	...	...
165,736	,,	Aug. 24	9	8	Maidstone 5 p.c. Cap. ...	123—128	...	...
63,480	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	51—56	...	...
75,000	5	Nov. 30	‡10	‡10	Malta & Mediterranean ...	6½—7	...	...
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	78—83	...	...
171,978	Stk.	Aug. 24	5	5	M. S. D. Utility "C." Cons.	76—81	...	...
718,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	67—72	...	...
112,126	,,	£	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
148,955	,,	£	5	5	Do. 5 p.c. Deb. ...	90—95	...	...
675,000	,,	May 21	‡6	‡6	Montevideo, Ltd.	70—80	...	...
2,061,315	,,	Aug. 10	5½	5	Newcastle & Gateshead Con.	16/—17/-[d]	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	67—69[d]	—1	...
691,705	,,	Jan. 4	3½	3½	Do. 3½ p.c. Deb. ...	68—70[d]	...	...
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Red. Deb.	96—98[d]	...	...
199,940	,,	Aug. 24	7½	7½	North Middlesex 6 p.c. Con.	105—110	...	...
396,160	,,	Aug. 10	5	5	Northampton 5 p.c. max. ...	74—79	...	...
300,000	,,	Nov. 30	7	9	Oriental, Ltd.	88—98	...	88½
60,000	5	18 May, '15	—	—	Ottoman	0—½	...	...
205,162	Stk.	Jan. 4	8	8	Plym'th & Stonehouse 5 p.c.	114—119	...	...
424,416	,,	Aug. 24	8	8	Portsm'th Con. Stk. 4 p.c. Std.	119—124	...	120
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	76—79	...	76½—77½
686,312	,,	Jan. 18	4	4	Primitiva 4 p.c. Rd. Db. 1911	75—85*	...	...
389,818	,,	Jan. 4	4	4	Do. 4 p.c. Cons. Deb.	75—85	...	...
150,000	10	Sept. 21	6	6	San Paulo 6 p.c. Pref. ...	7½—8	...	...
1,736,968	Stk.	Sept. 7	6½	6	Sheffield Cons.	103—105[e]	...	...
95,000	,,	Jan. 18	4	4	Do. 4 p.c. Deb.	79—81[e]*	...	...
133,201	,,	Sept. 7	5	8½	Shrewsbury 5 p.c. Ord. ...	90—95	...	...
90,000	10	June 11	‡5	‡5	South African	3⅛—5½	...	...
6,709,895	Stk.	July 23	7½	5	South Met. Ord.	95—99	...	96—98½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	103—108	...	104½—106
1,895,445	,,	Jan. 4	3	3	Do. 3 p.c. Deb. ...	54—59	+2	56½—58
1,000,000	,,	Jan. 18	4	5	Do. 5 p.c. Red. Deb.	93—98*	...	...
91,500	,,	Aug. 10	8½	8½	South Shields Con.	108—110[d]	...	...
1,543,795	,,	Aug. 10	6½	6½	South Suburban Ord. 5 p.c.	100—104	—1½	...
668,837	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	90—95	...	93—94
647,740	,,	Aug. 24	5	5	Southampt'n Ord. 5 p.c. max.	77—80	...	...
121,275	,,	Jan. 4	4	4	Do. 4 p.c. Deb.	70—75	...	...
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	,,	Jan. 4	6½	6½	Do. 6½ p.c. Red. Deb.	98—101	...	...
1,076,490	,,	Aug. 10	6⅝	6⅝	Tottenham and District Ord.	103—107	...	103½—104½
150,000	,,	,,	5⅛	5⅛	Do. 5½ p.c. Pref. ...	93—98	...	...
199,005	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	71—76	...	74
85,701	,,	Sept. 21	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	72—77	...	...
310,694	,,	Aug. 24	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	+2	104½—105
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	85—90	...	...
1,322,220	,,	July 9	7	7	Wandsworth and District: Consolidated	110—114	...	111½
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	90—95	+1	91⅞—94
1,167,964	,,	Jan. 4	5	5	Do. 5 p.c. Deb.	92—97	+2	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g* The interest due 1/1/32 was paid on that date. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. =10 p.ct. p.a. less tax and less tax on interim dividend.

(This announcement is inserted gratuitously.)

PETER—WITH ONE EXCEPTION

With one exception Peter is an ordinary little fellow. Chubby, likeable, just five-and-a-half, full of life and fun and on occasions—be it admitted—of naughtiness.

Just now Peter's rather important, for this is his first term at school, and he's grappling with the intricacies of "A B C" and "Twice Two": difficult subjects to all men of five-and-a-half, but even more difficult in Peter's case because—bad luck—he's totally blind. That's his One Exception.

Peter learns reading, writing, and 'rithmetic through the medium of "Braille"—dull stuff compared with the coloured picture books of most five-and-a-halfs. However, he's a stout lad is Peter, and he's making great progress.

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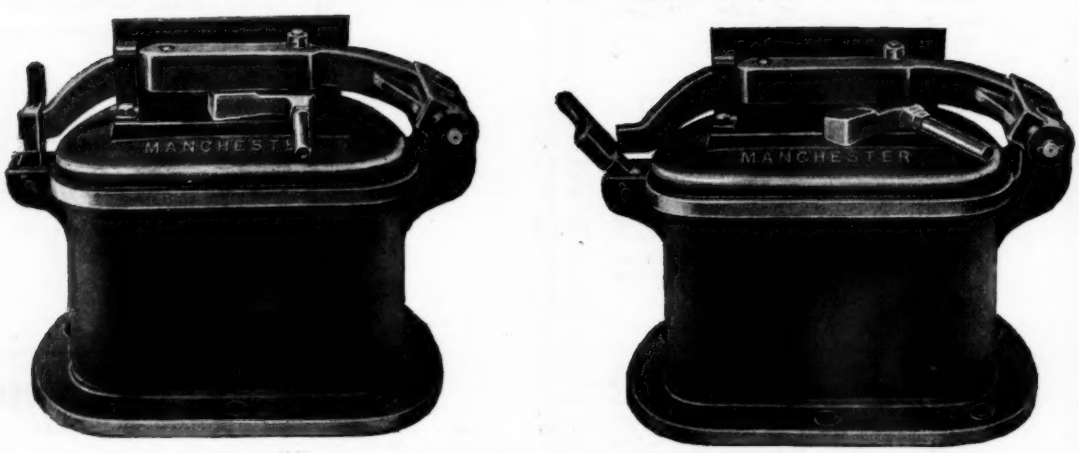

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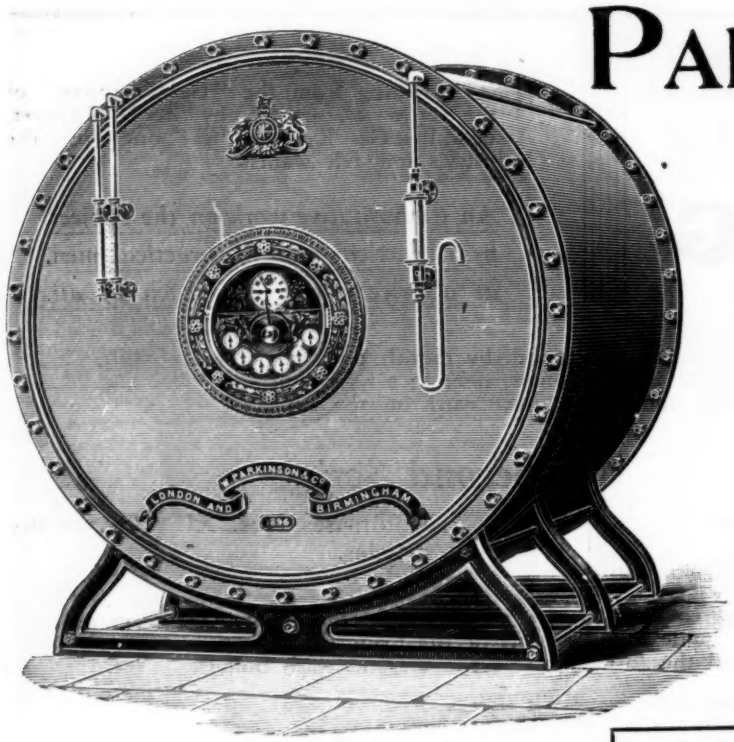

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